

# Annual Report on Forest and Forestry in Japan

Fiscal Year 2022

(Summary)

## Forestry Agency

Ministry of Agriculture, Forestry and Fisheries, Japan



The Annual Report on Forest and Forestry is a report which the Government of Japan (GOJ) submits to the Diet every year, in accordance with article 10 of the Forest and Forestry Basic Act. This document is a summary of the annual report for fiscal year (FY) 2022.

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## Special Topic

# Forest Conservation Measures in Response to Climate Change

In Japan, which has steep topography and a lot of rainfall, forest conservation measures have contributed to protecting people's lives and properties from mountain disasters. On the other hand, social requirements to make the national lands more resilient against disasters is getting higher since changes in precipitation patterns are causing intensification of mountain disasters due to climate change in recent years.

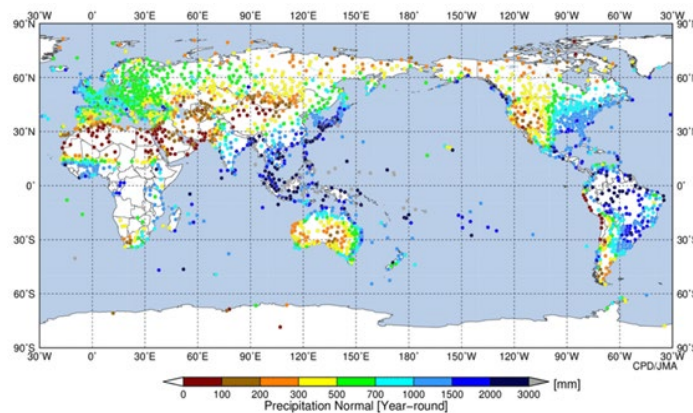
Therefore, this Special Topic describes the measures and effects of forest conservation so far and introduces the direction of future measures for forest conservation in response to climate change.

## 1. Forest Functions and Roles of Forest Conservation Projects

### (1) Land Conservation Function of Forests

**Forests play an important role in national land conservation, with multiple functions including mountain disaster prevention and water resource cultivation.**

Japan is particularly vulnerable to erosion caused by rain, making it prone to mountain disasters and floods. The reason is that Japan has steep topography and fragile geology due to active mountain-building activity. Additionally, Japan experiences high amount of rainfall among the world with frequency occurrences of strong precipitation events such as typhoons and the rainy season (Fig. 1).



Source: Japan Meteorological Agency website "World Climate chart"

Note: This map shows normal year figures from 1991 to 2020.

**Fig. 1 Distribution of global average annual precipitation**

At the same time, most of Japan's mountainous areas are covered with forests as the moist environment helps forests grow.

Forests have land conservation functions. A main element of the land conservation functions of forests is mountain disaster prevention and soil conservation function, which works for preventing soil erosion and shallow landslides. Another main element is water conservation function, which equalizes the amount of water runoff into rivers. These functions are fulfilled through healthy forest soils which maintain high penetrability and water retention capacity and through healthy tree stands which firmly bind the forest soils to slopes.

Forests also have other disaster prevention functions, such as preventing wind damage, blown sand damage, and avalanches and mitigating damage caused by tsunamis.

## **(2) Forest Conservation (CHISAN) Projects to Maintain and Improve Forest Functions**

**The Government of Japan (GOJ) and prefectural governments are implementing forest conservation projects, such as stabilizing mountainside slopes and restoring/managing devastated streams in order to protect the lives and property of the people from mountain disasters.**

Forest conservation projects are crucial measures for land conservation. The projects intend to maintain forests which have vital land conservation functions (designated as protection forests) or to restore collapsed forests. Prefectural governments implement the projects in private and public forests, and the GOJ (Regional Forest Offices) does the projects in national forests. In some private/public areas which require advanced technologies for restoration or are essential for land conservation, the GOJ implements the projects based on requests from prefectures.

Forest conservation projects include hillside work to stabilize mountain slopes, torrent work to stabilize the lower part of mountain slopes by controlling the erosion of mountain streams, and landslide prevention work dedicated to areas where part of the slope move in lumps slowly and repeatedly due to groundwater. In addition, adjustment of the number of trees and planting trees in protection forests are implemented to maintain the health of protection forests, under the necessity.

## **2. History and Accomplishments of Forest Conservation Projects**

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### **(1) History of Responses to Frequent Forest Devastation and Mountain Disasters**

**The devastation of forests had progressed when the use of forest resources expanded. However, Japan's forests have recovered and enriched since forest conservation projects were launched as a national project in 1911 during the Meiji period, and planned projects had been implemented with advanced technologies after World War II.**

#### **The Situation until the Edo Period**

In Japan, people have obtained many resources from forests which are necessary for economic activities since its recorded history. They used wood for buildings and tools, fuelwood for living and industries such as salt and iron manufacturing, and plants and fallen leaves for farmland fertilizers. The devastation of forests had expanded until the Edo period due to population growth and economic development, and it occurred debris flows in mountainous area, floods in low area, and blown sand damage in coastal area.

At the same time, forest conservation measures such as setting mountain areas where logging was banned, and afforestation through tree planting, were implemented. These are the origin of the principle of current forest conservation.

#### **The Beginning of Forest Conservation Projects in the Meiji Period**

After the Meiji period started in 1868, the frequency of disasters increased because growing modern industries needed more forest resources and accelerated deforestation. To cope with the problem, modern legislation was progressed, and the Three Flood Control Acts: the River Act, the Erosion Control Act, and the Forest Act, were enacted in the period 1896-1897. Protection forest system was established in the Forest Act, and it continues to the present day.

In 1911, the Meiji government launched forest conservation projects as public projects to accelerate forest restoration, and forests started to recover (Fig. 2).

**Responses to Forest Devastation and Frequent Mountain Disasters due to World War II**

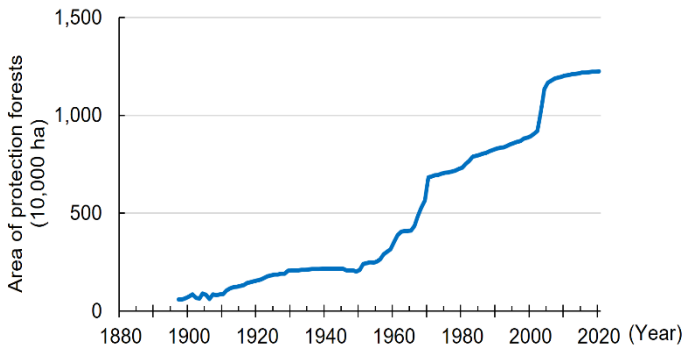
Deforestation progressed during and after World War II, and the areas of afforestation-abandoned sites reached approximately 1.5 million hectares. In addition, large typhoons caused mountain disasters and flood damage frequently.

In 1948, the "Five-Year Plan for Forest Conservation" was started. In 1951, the GOJ established a system of protection area for forest conservation in the revised Forest Act. As a result, forest conservation projects were positioned under the Forest Act and linked to the protection forest system. In 1954, the Temporary Measures Act for Protection Forest Consolidation was enacted, and the GOJ promoted the designation of protection forests (Fig. 3).

At the same time, afforestation is also encouraged through the GOJ's support as a public project. The Act on Temporary Measures for Afforestation was enacted in 1950. The first National Tree Planting Ceremony was held in the presence of His Imperial Majesty in the same year and continues to the present (Fig. 4).



**Fig. 2 Forest devastation before implementing forest conservation projects**  
(1913, Siga Prefecture)



Sources: Forestry Agency "Handbook of forestry Statistics" and "Handbook of forest and forestry Statistics"

**Fig. 3 Changes in the area of protection forests**



**Fig. 4 The 1st National Tree Planting Ceremony**  
(© Yamanashi Prefecture)

**Development of Forest Conservation Measures**

The Act on Emergency Measures for Forest Conservation and Flood Control was enacted in 1960. Since then, the GOJ has formulated and implemented the Five-Year Plan for Forest Conservation Projects nine times. At the same time, developed engineering techniques accelerated afforestation in devastated areas, including remote collapsed areas (Fig. 5).



Under working



19 years after work

**Fig. 5 Restoration of devastated areas by hillside work (Shodoshima-Town, Kagawa Prefecture)**

In 2004, the Act on Emergency Measures for Forest Conservation and Flood Control and

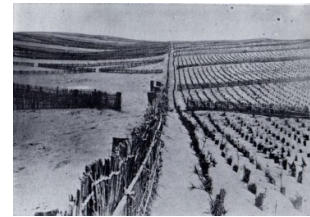
the Temporary Measures Act for Protection Forest Consolidation were abolished as the restoration of rich forests had progressed. After that, the Forestry Agency has been implementing forest conservation projects based on the "forest development and conservation project", which was established under the Forest Act.

In 2013, the Forestry Agency selected 60 representative sites that have especially contributed to national land conservation and announced them to the public because the 100 years had passed since the forest conservation projects started and most of the sites were covered by the rich forests.



Since the Edo period, people have created coastal disaster-prevention forests in various regions with ingenuity to deal with severe blown sand damage which was caused by the sediment supply from devastated upstream areas. The coastal disaster-prevention forests protect people's livelihoods and agriculture and provide beautiful landscapes of white sands and green pine trees in the present day.

Furthermore, considering that coastal forests mitigated the tsunami damage caused by the Great East Japan Earthquake in 2011, development of healthy coastal disaster-prevention forests, which contribute to achieving comprehensive disaster-prevention functions, is implemented across Japan.

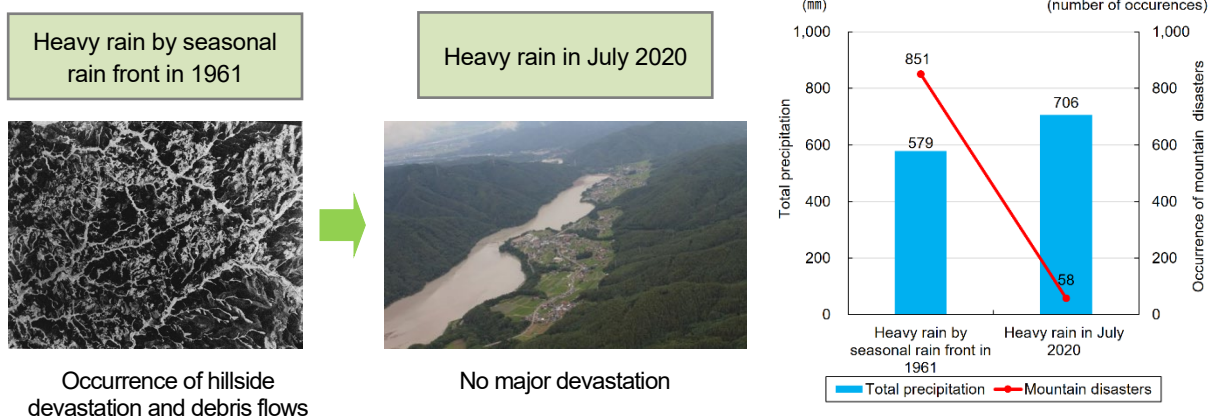


Afforestation and windbreak fences (1918, Kaga City, Ishikawa Prefecture)

## (2) Reduction of Mountain Disasters

The restoration and growth of forests through forest conservation measures and forest management have made Japan's land more resilient to mountain disasters.

In many areas, it was observed that the number of locations where disasters occur decreased significantly over 50 years, when compared under the condition that heavy rain of the same level hit the area (Fig. 6). In Japan as a whole, the area affected by mountain disasters decreased from an average of about 11,000 ha per year in the period 1955-1959 to an average of about 320 ha per year in the period 2018-2022.



Sources: The information on the "Heavy rain by seasonal rain front in 1961" was surveyed by the Forestry Agency. The total precipitation and the number of mountain disasters of Heavy rain in July 2020 were surveyed by the Japan Meteorological Agency and the Forestry Agency, respectively.

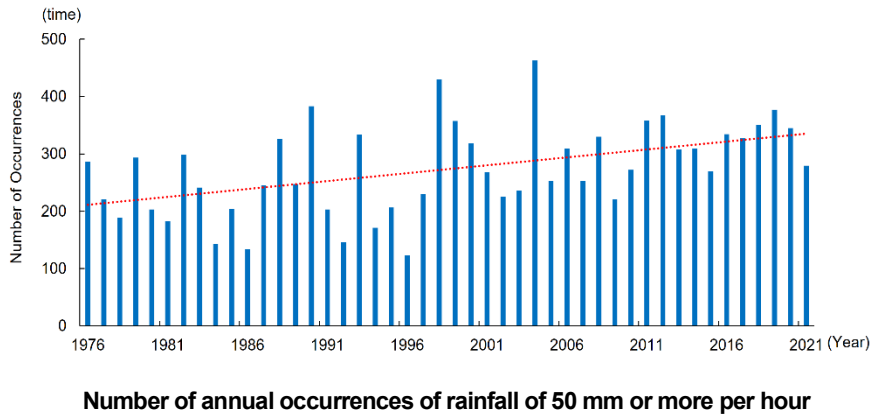
**Fig. 6 Reduction of mountain disasters in the Inadani region of Nagano Prefecture**

### 3. Intensification and Morphological Changes of Mountain Disasters Caused by Climate Change

#### (1) Increase in Heavy Rain Caused by Climate Change

In recent years, the annual frequency of short-term heavy rain has increased, and the total precipitation during a specific period due to linear rainbands has also increased (Fig. 7).

The IPCC Sixth Assessment Report released in 2021 predicts that the frequency and intensity of extreme events such as heavy rain will increase globally.



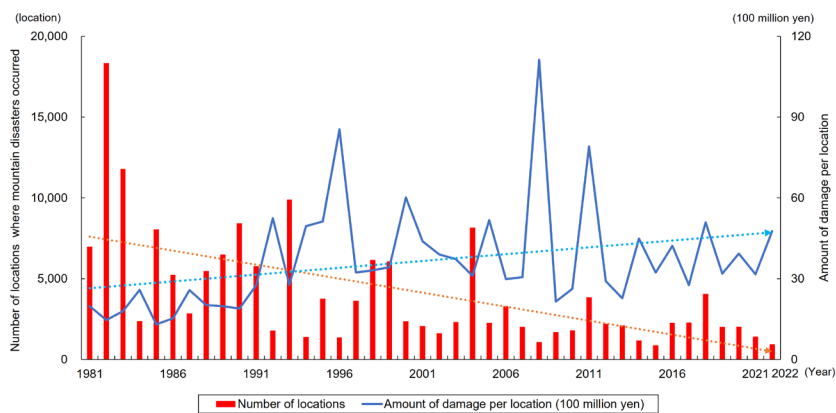
Source: The Forestry Agency created this chart based on the website of the Japan Meteorological Agency.

**Fig. 7 Increase in short-term heavy rain**

#### (2) Intensification and Morphological Changes of Mountain Disasters and the Policy of Countermeasures

The GOJ considered the policy to strengthen advanced disaster prevention countermeasures responding to mountain disasters, which are intensifying and changing in mechanism.

In recent years, the scale of mountain disasters in one place has increased and the disaster mechanism has also changed (Fig. 8), while the restoration and growth of forests have significantly reduced the number of mountain disasters such as shallow landslide. It is assumed that the reason is climate change, which has caused heavier and more frequent rain.



Source: Survey by Forestry Agency

**Fig. 8 Number of locations where mountain disasters occurred and the amount of damage per location**



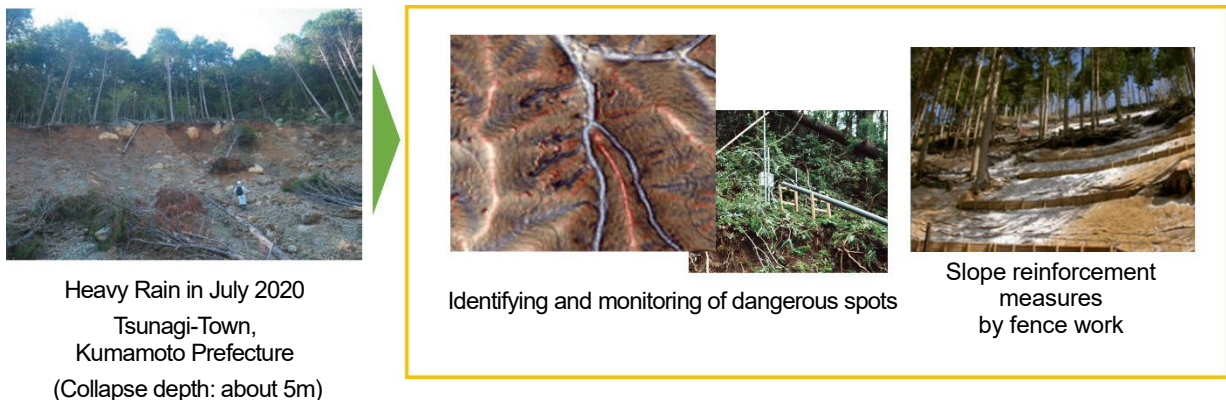
In future forest conservation measures, it is crucial to strengthen the advanced disaster prevention countermeasures against the impact of climate change through enhancing forest function in national land conservation and improving forest conservation facilities in high-risk locations effectively.

The Forestry Agency analyzed and grasped the characteristics of recent disasters and discussed the effective and efficient advanced disaster prevention countermeasures in the "Study Group on Future Forest Conservation Measures for Heavy Rain Disasters". The group made the following recommendations in March 2021.

### a) Collapse of slightly deeper layers than the topsoil

A large amount of rainwater permeates deep layers of forest soils, and the phenomenon of collapse of slightly deeper layers than topsoil, where tree roots do not penetrate, has been observed. The phenomenon may cause more sediment to flow down with driftwood. It is necessary to work on measures to reduce the risk of collapse and to monitor the signs of collapse in locations that the debris flow may cause damage to downstream settlements.

To deal with the problem, it is recommended to identify sites where taking countermeasures or monitoring is necessary and to promote construction work to reinforce slopes (Fig. 9).



**Fig. 9 Occurrence of collapse of slightly deeper layer than the topsoil and the countermeasures**

### b) Increase in the erosion caused by mountain streams

There are concerns that the increased flow of mountain streams during heavy rain will increase the amount of erosion and sediment runoff and increase the risk that trees along the stream become driftwood.


To deal with the problem, it is encouraged to stabilize the entire stream by installing different types of erosion control dams according to the condition of the stream. For example, in areas close to villages, thick and strong erosion control dams should be installed to protect the villages from debris flow. In areas far from villages, small-scale dams should be installed in steps to prevent the erosion caused by mountain streams. As for driftwood generation, it is recommended to install driftwood trapping dams, to remove dangerous trees in mountain stream areas, and to implement forest transformation (Fig. 10).




East Japan typhoon in 2019  
Marumori-Town, Miyagi Prefecture  
(Longitudinal erosion of  
mountain streams: 2-3m)



**Installing different types of erosion control dams  
according to the condition of the stream**




A thick erosion control dam  
that can withstand the  
impact of a debris flow




A small-scale dam  
installed in steps

**Implementing measures against occurrence and outflow of driftwood**



Development of a  
driftwood trap erosion  
control dam



Removing dangerous trees  
along mountain streams

**Fig. 10 Increase in the erosion caused by mountain streams and the countermeasures**

**c) Simultaneous occurrence of mountain disasters due to linear rainbands and other related events**

There is a concern that mountain disasters may occur simultaneously in areas where linear rainbands have occurred.

To deal with the problem, it is encouraged to increase the implementation rate of forest conservation measures in areas where the risk of debris flows and other disasters is exceptionally high and to utilize existing facilities effectively by increasing these capacity.

**d) Intensification of flood damage and driftwood disasters**

There is a concern about the intensification of flood damage in downstream areas due to intense and frequent heavy rains. It is also problematic that sediment and driftwood may obstruct river water flow and increase the flood damage.

To maintain forest soils with penetrability and water retention capacity, it is encouraged to combine the management of protection forests and simple civil engineering work to prevent soil runoff. Developing erosion control dams and countermeasures against driftwood are also effective to deal with the problem.

**4. Future Forest Conservation Measures in Response to Climate Change**

**(1) Positioning in the Basic Plans and Others**

**The GOJ has positioned forest conservation measures for disaster prevention and mitigation in the Basic Plan for National Resilience and the Basic Plan for Forest and Forestry.**

The Basic Plan for National Resilience, approved in December 2018, states that the GOJ will strengthen mountain disaster measures for advanced disaster prevention and mitigation. The "Three-Year Emergency Response Plan for Disaster Prevention, Disaster Mitigation,

and Building National Resilience" was also approved by the Cabinet simultaneously. Based on this plan, the GOJ and prefectural governments implemented measures, such as installing forest conservation facilities and driftwood countermeasures, in locations where especially urgent measures are required.

In 2020, the Cabinet approved the "Five-Year Road Program for Disaster Prevention, Mitigation and National Resilience", which promotes measures against intensified wind and flood damage as the priority measures to continue building national resilience. As for the forest conservation projects, strengthening the development of forest conservation facilities has been implemented in the areas such as mountain disaster hazard zones and areas around important infrastructure.

In June 2021, the GOJ revised the Basic Plan for Forest and Forestry and the National Forest Plan. The plans will implement the following initiatives based on the "Summary of Study Group on Future Forest Conservation Measures for Heavy Rain Disasters" to promote practical forest conservation projects and others.

- (1) Suppression of sediment runoff through carefully placing erosion control dams in mountain disaster hazard zones
- (2) Enhancing the conservation of forest soils through a combination of forest management and installation of step work to mountainside slopes
- (3) Logging of dangerous trees in areas of mountain streams and mitigation of the risk of driftwood disasters by forest transformation and other related measures
- (4) Preparation against tsunamis and wind damage by strengthening management of coastal disaster prevention forests and other forests

These initiatives will be implemented under the collaboration with "River Basin Disaster Resilience and Sustainability by All", based on the "Five-Year Road Program for Disaster Prevention, Mitigation and National Resilience" and other plans.

## **(2) Specific Initiatives**

**The GOJ and local governments will conduct intensive forest conservation measures, collaboration with "River Basin Disaster Resilience and Sustainability by All", extension of the lifespan of existing facilities, utilization of ICT and taking non-structural measures.**

### **Promotion of Forest Conservation Measures for National Resilience**

The GOJ set a goal that the implementation rate of forest conservation measures will be increased from 65% in FY2020 to 80% in FY2025 in areas with particularly high urgency among mountain disaster hazard zones in the "Five-Year Road Program for Disaster Prevention, Mitigation and National Resilience". The Forestry Agency is implementing the measures intensively for achieving the goal.

The measures implemented under the "Three-Year Emergency Response Plan for Disaster Prevention, Disaster Mitigation, and Building National Resilience" have been effective in various areas, such as suppressing sediment runoff under heavy rains.

### **Collaboration with River Basin Disaster Resilience and Sustainability by All**

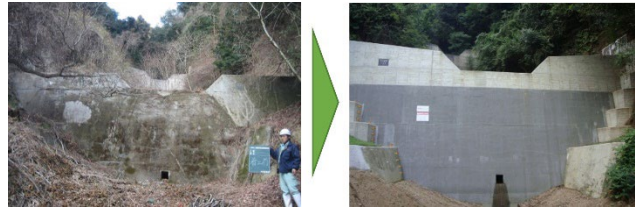
Based on the intensification and the frequency of flood damage due to the effects of climate change, the Ministry of Land, Infrastructure, Transport and Tourism, other related ministries and agencies, local governments and other related institutions are collaborating on the "River Basin Disaster Resilience and Sustainability by All", in which all relevant parties work

together to mitigate flood damage throughout the basin. In March 2021, the "River Basin Disaster Resilience and Sustainability by All" projects were formulated and announced for all first-class river systems, and forest management and forest conservation measures were positioned in these projects.

The Forestry Agency is implementing works such as thinning and installing step work to improve the water retention capacity of forests. Also, it is working on suppressing sediment and driftwood runoff so as not to block rivers.

**Measures to Extend the Lifespan of Forest Conservation Facilities**

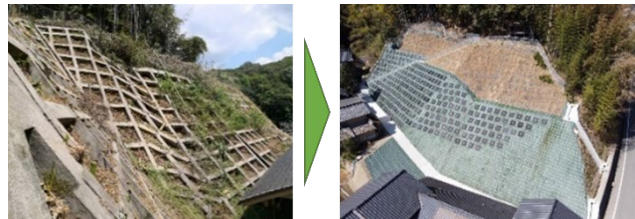
Local governments and the GOJ (Regional Forest Offices) promote effective use of dilapidated facilities by improving and enhancing their functions for efficient advanced disaster prevention measures (Fig. 11).



Enhancing functions and extending lifespan of existing dams by raising and thickening  
(Kobe City, Hyogo Prefecture)

**Initiative for Effective and Efficient Measures Utilizing New Technologies**

The utilization of 3D laser scanners, aerial lasers, drones, ICT backhoes, wearable cameras and other new technologies is being promoted in various places to implement projects safely and efficiently in response to the increase in amount of restoration work, especially work in dangerous sites.



Improving the stability of mountainside slopes by renewing aging facilities  
(Onomichi City, Hiroshima Prefecture)

**Providing Information on Mountain Disasters**

The GOJ uses remote systems to monitor some high risk mountain disaster hazard zones and provides the information to prefectural governments and municipalities for early detection and response to disasters.

The GOJ and prefectural governments are providing map information on mountain disaster hazard zones and conducting disaster prevention lectures to residents in hilly and mountainous villages by cooperating with efforts to develop local evacuation systems.

**Fig. 11 Extending the lifespan and enhancing functions of forest conservation facilities**

**5. Disaster-Resilient Community Development Promoted by the Whole Forest and Forestry Policies**

**The GOJ promotes the development of disaster-resistant societies through managing and conserving forests appropriately, considering forests as "Green social capital". It takes forest conservation measures and more comprehensive policies for forest and forestry.**

To bring out the multiple functions of forests, including the function of land conservation, the forest planning system secures appropriate forest management through zoning according to the function of forests to be emphasized, a notification system of logging and afforestation, and other efforts and promotes the establishment of diverse forests according to natural and social conditions.

In addition, the Forestry Agency implements measures for promoting forest management activities: support for forest owners' activities through forest management projects,

development and spread of technologies for reducing afforestation costs, and the accumulation and consolidation of forests with the Private Forest Management Entrustment System. These measures are implemented because forest management, including thinning and reforestation, has not progressed in recent years due to a decline in the management motivation of forest owners and an increase in forests where the ownership is unclear.

Also, the Forestry Agency promotes the development of forestry road systems, which are resistant to disasters. Such road systems serve as substitute roads when disasters such as heavy rains damage national roads and municipal roads and contribute to preventing and resolving village isolation.

Maintenance and creation of forests through forest conservation measures and forest management contribute to adaptation measures against the intensification of mountain disasters and floods caused by climate change, and also contribute to climate change mitigation by strengthening CO<sub>2</sub> absorption function of forests. In addition, the maintenance and improvement of forest functions through forest conservation measures meet the concept of Ecosystem-based disaster risk reduction (Eco-DRR) and Green Infrastructure.

Thus, forests are seen as "Green social capital", which brings various benefits to the people, including disaster prevention and mitigation. Managing and conserving forests appropriately with integrated policies for forest and forestry is expected to contribute to developing sustainable society.

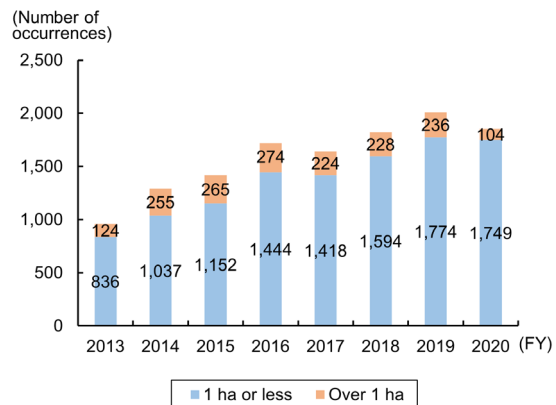
## Forests and Forestry Topics for FY2022

### Topic 1: Review of Forest Land Development Control System for the Appropriate Introduction of Solar Power Generation

In Japan, there has been a growing social need to review the Forest Land Development Control System for coexistence of solar power generation facilities and local communities due to concerns about disasters and deterioration of landscapes caused by increasing forest land development activities to install solar power generation facilities.

The committee on forest land development control standards concerning solar power generation, established by the Forestry Agency, recommended to lower the threshold of development area subject to the regulation based on the occurrence of sediment runoff caused by forest land development for installing the facilities.

Based on the recommendation, the Forestry Agency amended the Order for Enforcement of the Forest Act regarding the forest land development related to solar power generation facilities to lower the threshold of development area subject to the regulation from over 1 ha to over 0.5 ha in September 2022 (enforced in April 2023).



Source: Survey by Forestry Agency

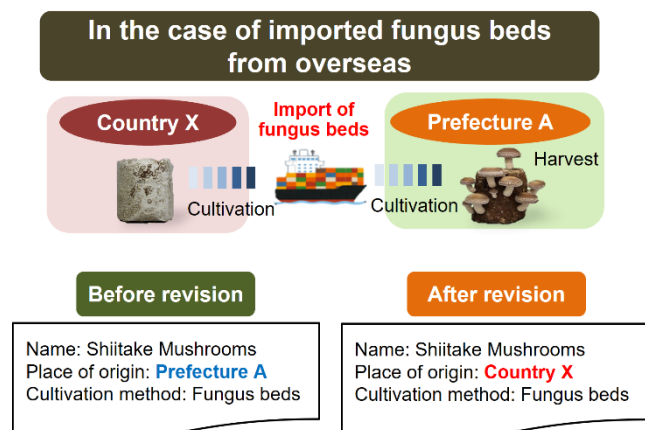
Note: "Over 1 ha" shows the number of forest land development control in each fiscal year (new permits only). "1 ha or less" shows the number of logging notifications for solar power generation submitted in each fiscal year.

**Fig. Number of forest land development aimed at installing solar power generation facilities**

### Topic 2: New Labeling of the Origin of Shiitake Mushrooms Has Started

Japan's food labeling rules stipulated that the place of origin of shiitake mushrooms should be labeled as the place of harvest. However, due to the recent increase in imported fungus beds, it became difficult for consumers to distinguish between shiitake mushrooms derived from fungus beds inoculated/cultivated in foreign countries and those inoculated/cultivated domestically.

Since the environment in the early stages of cultivation strongly affect the quality of the fruiting body of shiitake mushrooms, the Consumer Affairs Agency revised the rules shown in "Food labeling standards Q&A" in March 2022 to require that the label indicate the inoculated place of shiitake mushrooms as the place of origin in order to provide consumers the opportunity to make informed and independent food choices.



### Topic 3: Toward the Attractive Forestry Industry where Forestry Workers can Work with a Sense of Purpose ~Revision of "Basic Policy concerning the Security of Forestry Work Force"~

The Forestry Agency revised the Basic Policy concerning the Security of Forestry Work Force in October 2022 to promote to secure the forestry workforce for wood production, reforestation and nurturing of forests toward the realization of "Green growth" as indicated in the Basic Plan for Forest and Forestry revised in June 2021.

The main revisions are as follows:

- Promoting the securing and development of human resources with knowledge and skills necessary to realize the "New forestry," such as reforestation and ICT
- Strengthening safety measures taken by small-scale management entities and promoting the introduction and development of high-performance forestry machinery to address the high incidence of occupational accidents
- Promoting the initiatives for new entries and start-ups into the forestry industry according to local situations
- Promoting active participation and retention of female workers and considering appropriate acceptance of foreign workers



Training in the safe use of chainsaws



A female forestry worker handling a high-performance forestry machinery

### Topic 4: Creating a Virtuous Cycle of Forest Management and Companies' Decarbonization Efforts through the J-Credit

The J-Credit scheme is a domestic carbon crediting system operated by the GOJ, designed to certify greenhouse gas (GHG) emissions reductions and removals achieved through validated projects as "credits". When companies with the aim to achieve decarbonization of their activities purchase credits derived from forest management projects, the payment for the credits is expected to ramp up forest management activities, further contributing to the realization of carbon-neutral society by 2050.

The Forestry Agency, along with other J-credit administrators, revised the standards and methodologies for the forest management projects in August 2022 to allow for enhanced reforestation after final-felling, which is a key to ensure forest carbon removals.



TOCHIMOU Wood Industry Co., Ltd. acquired credit certification for the first time in Tochigi Prefecture in 2022 and sold 50 CO<sub>2</sub> tons each to three local companies with the Ashikaga Bank, Ltd acting as an intermediary.



In addition, the Forestry Agency has established a new initiative, "Forests × Decarbonization Challenge," to promote forest management activities by companies from the perspective of "decarbonization", and awarded ten companies for their efforts in 2022.

<https://www.maff.go.jp/e/policies/forestry/attach/pdf/index-28.pdf>



## Topic 5: Business with the Timber Harvesting Rights System in National Forests Has Started

The Timber Harvesting Rights System is a system in which private enterprises can acquire the right to harvest trees steadily in certain designated areas of national forests for a certain period while ensuring multiple functions of the forest.

Based on the system, the Forestry Agency designated ten areas nationwide from September to October 2021, with each area of about 200 to 300 ha (clear-cutting equivalent) for a period of about ten years. Furthermore, the Forestry Agency has publicly solicited and decided forestry contractors that receive the timber harvesting right in eight areas by October 2022. Logging and other operations have started in sequence.

The system is expected to strengthen the management base of the forestry contractors with the timber harvesting right as well as the timber supply chain in the region.



## Chapter I

# Forest Management and Conservation

## 1. Promoting Appropriate Management and Conservation of Forests

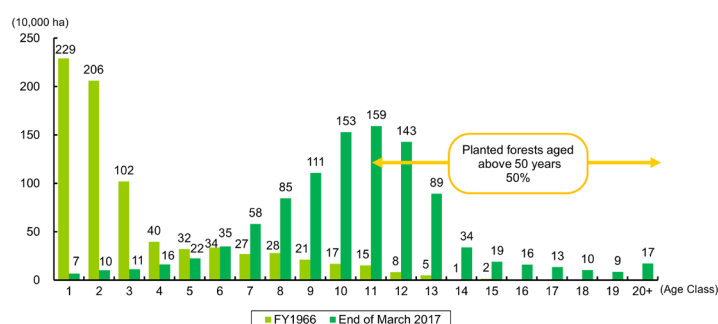
### (1) Current State of Forests and Multiple Functions

Japan's forests cover about 25 million hectares, which accounts for two-thirds of the national land area. About 40% of them are planted forests. Half of the planted forests are aged above 50 years and entering their period of use (Fig. I-1). The forest area consists of private forest, public forest, and national forest, which account for 57%, 12%, and 31%, respectively (Fig. I-2).

The stock of forest is steadily expanding mainly on planted forests, reaching about 5.2 billion m<sup>3</sup> by the end of March 2017.

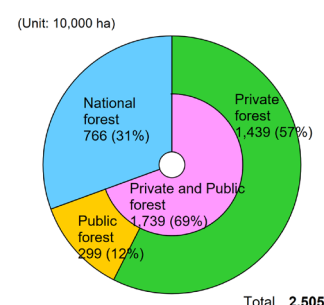
Forests contribute to the people's lives and economies through their multiple functions including land conservation, water resource conservation, mitigating global warming, wood production and biodiversity conservation.

Through these multiple functions, forests also contribute to the achievement of SDGs and net-zero by 2050 and to the economic and social benefits of forestry and wood industry.



Sources: Forestry Agency "State of Forest Resources" (March 31, 2017) and "Forest Resources of Japan" (April 1968)

Note: Age-classes are divided by 5 year-period steps. "Age-class 1" includes the 1st to 5th year after planting with the year of planting counted as the 1st year.



Source: Forestry Agency "State of Forest Resources" (March 31, 2017)

Fig. I-1 Changing forest age class configuration of planted forests      Fig. I-2 Forest area by owners

### (2) The Fundamental Framework of Forest Plans for Appropriate Management and Conservation

To make sure forests perform their multiple functions sustainably, the GOJ formulates the Basic Plan for Forest and Forestry (latest revision in June 2021) in accordance with the Forest and Forestry Basic Act. The Basic Plan sets targets for the state of forests and the supply of forest products, and specifies measures to be taken by the GOJ.

The Minister of Agriculture, Forestry and Fisheries formulates the National Forest Plan under the Forest Act. The National Forest Plan sets targets for forest management and conservation, the amount of logging, and reforestation areas to align with the Basic Plan for Forest and Forestry. Prefectural governors formulate Regional Forest Plans based on the National Forest Plan. Mayors of municipalities formulate Municipality Forest Plans, in accordance with the Regional Forest Plans, that indicate zoning and forestry road system plans according to the functions of forests to be emphasized.

### (3) Research and Development

In the “Strategy for Research and Technology Development in Forest, Forestry, and Wood Industry” revised in March 2022, the Forestry Agency has stated a policy to promote the following development; (1)prediction of the impact of climate change on domestic and foreign forests and forestry; (2)sophistication of monitoring technology to calculate forest removals with high accuracy; (3)cost reduction of afforestation and silviculture technology; (4) development of cross-laminated timber (CLT) utilization technology; and (5) development of superior seedlings, and so on. Furthermore, the Forestry Agency updated the “Forestry Innovation Field Implementation Promotion Program” in July 2022 to accelerate innovation in the forestry sector.

The GOJ has stated policies of working on zero emissions by smart forestry and the establishment of technology for long-term and large-scale carbon storage by forests and wood in the "Green Growth Strategy Through Achieving Carbon Neutrality in 2050," published in December 2022. The Forestry Agency is promoting related development using the Green Innovation Fund created based on this strategy. In addition, the Ministry of Agriculture, Forestry, and Fisheries (MAFF) has developed a “Strategy for Sustainable Food Systems” to promote innovation for reducing environmental impact in a medium- to long-term perspective. In the forest and forestry sector, the strategy promotes the development and dissemination of superior seedlings, the development of automated forestry machinery, the utilization of ICT, the construction of wooden high-rise buildings and the development of wood-based chemical materials such as glycol lignin.

Forestry promotion instructors assigned in each prefecture disseminate and instruct forestry technology to forest owners, forestry workers, municipal officials, and other related people. Furthermore, the Forestry Agency develops Foresters who support municipal governments’ forest administration and management.

## 2. Forest Management

### (1) Promotion of Forest Management

In order to secure the multiple functions of forests for future, appropriate forest management is required. It is achieved by appropriate and adequate forestry practice on planted forests, such as thinning and replanting after harvesting, and establishment of diverse forests depending on its natural conditions, such as diversification of logging age and inducement of coniferous planted forests into multi-layered forests or mixed forests.

Furthermore, it is vital to enhance carbon dioxide removals by forests through thinning and reforestation to achieve the forest removals target of approximately 38 million CO<sub>2</sub> ton in FY2030 (equivalent to approximately 2.7% of Japan’s total emissions in FY2013) as set out under the Paris Agreement and also to contribute to net-zero by 2050.

To respond to these issues, the Forestry Agency supports forest management activities by private and public forest owners through forest management projects. And the Forestry Agency conducts forest management steadily in national forests (Fig. I-3).

(Unit: 10,000 ha)

Type of work	Private and public forest	National forest	Total
Tree planting	2.3	1.1	3.4
Post establishment nurturing	36	14	50
Thinning	27	10	37

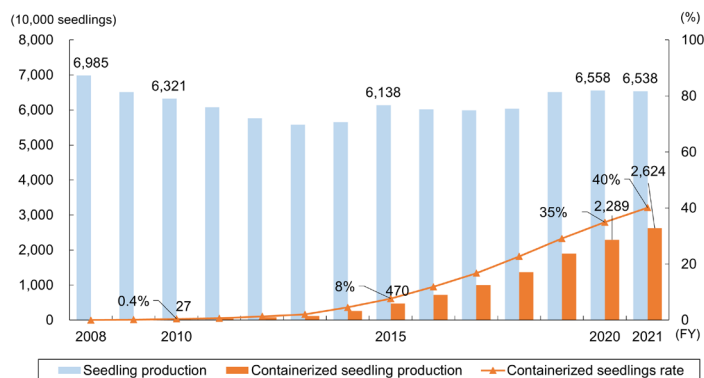
Source: Survey by Forestry Agency

Note: Area of Thinning represents a result of the forest sink measures.

**Fig. I-3 Forest management area (FY2021)**

## (2) A Stable Supply of Superior Seeds and Seedlings

It is essential to improve the supply capacity of seedlings for reforestation due to the expected increase in harvesting of planted forests. In particular, the production proportion of containerized seedlings, which allow a longer planting period, should be increased to help reduce reforestation costs. About 65 million seedlings were produced for planting in FY2021, about 40% of which was raised using containers (Fig. I-4).



Source: Survey by Forestry Agency

Fig. I-4 Production of seedlings for afforestation

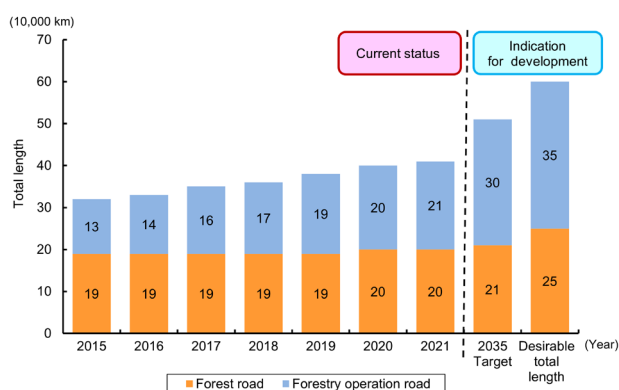
Furthermore, it is crucial to develop and supply varieties with superior growth aiming at the increase in carbon dioxide removals and forestry yield and the efficiency of afforestation and nurturing. The Forest Research and Management Organization has been developing the "elite trees" which are selected varieties with faster initial growth and good wood quality through crossbreeding and selection. The MAFF designates trees that meet criteria such as superior growth as the "specified mother trees" and promotes especially the designation of the "elite trees" in recent years. As of March 2023, 492 varieties have been designated as "specified mother trees" with superior growth, of which 344 are the "elite trees." The Forestry Agency is promoting the development of seed and hedge orchards to increase the seedlings derived from "specified mother trees".

## (3) Development of Forestry Road Systems

The Forestry Agency promotes to develop forestry road systems, which are essential infrastructure for forestry and livelihood of mountain villages. Forestry road systems have been developed to reach the total length of 410 thousand km in FY2021 (Fig. I-5).

## (4) Private Forest Management Entrustment System and Forest Environment Tax

Since small-scale forest ownership accounts for most private forests in Japan, consolidation is vital for promoting forest management, and the Forestry Agency had promoted consolidation effort of forestry management entities, such as forest owners' cooperatives. However, further consolidation efforts by the forestry management entities had been getting difficult due to the difficulty of tracking forest owners because of changes in generations and the decline in interest in forest management. Therefore, the Private Forest Management Entrustment System was enforced in April 2019 through the Private Forest Management Entrustment Act.



Source: Forestry Agency

Note: Forestry roads include "operation roads used mainly by timber transport trucks".

Fig. I-5 Current status of forestry road systems and the indication for development

Under the Private Forest Management Entrustment System, local municipalities can be

entrusted with the management of forests whose owners are unable to manage appropriately. The municipalities can re-entrust the management of those forests that are suitable for forestry activities to private forestry operators who authorized by prefectural governments. For the forests which are not suitable for forestry activities and are required to fulfill multiple functions, the municipalities manage those entrusted forest by themselves.

By FY2021, 975 municipalities conducted the “questionnaires of forest owners’ intention”, the first step of the entrustment process, for approximately 600,000 ha of private forest.

Also in 2019, the Forest Environment Tax and Forest Environment Transfer Tax were introduced for the funding of forest management activities by local municipalities. While the Forest Environment Tax will be imposed on each individual as a national tax at a rate of 1,000 yen per capita per year from FY2024, the Forest Environment Transfer Tax has been transferred to all the municipalities in Japan for the expenses of their forest management activities since FY2019.

The utilization of the Forest Environment Transfer Tax is increasing yearly, and the total amount of the utilization plan for FY2022 is 40.5 billion yen. The efforts are steadily progressing. For example, the area of forest management using this tax, such as thinning, is about five times in FY2021 as large as the first year of FY2019.

### **(5) People’s Participation in Forest Management**

Forest management activities by organizations such as NPOs and companies are expanding. The number of planting groups in Japan topped 3,671 in FY2021. In recent years, more companies are willing to get involved in forest management with increasing interest in SDGs and ESG investment.

## **3. Forest Conservation**

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### **(1) Management and Conservation of Protection Forests**

“Protection forests” are designated in accordance with the Forest Act when it is considered particularly necessary that they provide important public benefits. Felling and forest development are regulated in them. At the end of FY2021, 12.26 million ha of forests were designated as protection forests. Even when a forest except a protection forest will be diverted, the Forest Land Development Control System secures public benefits. In addition, Dangerous embankments are comprehensively regulated under nationwide uniform standards regardless of land use, including residential land, forestland, and cropland, according to the Act on Regulation of Residential Land Development and Specific Embankments enacted in May 2022.

### **(2) Disaster Control**

The Forestry Agency promotes integrated forest conservation projects including accurate clarification of mountain disaster hazard zones, restoration of devastated forests, and development of coastal forests. When natural disasters occur in mountainous areas, the Forestry Agency conducts immediate surveys and elaborates recovery works.

### **(3) Conservation of Forest Biodiversity**

The Forestry Agency promotes establishment of diverse forests depending on its natural conditions, and protection and management of primeval forest ecosystems.

Additionally, the Forestry Agency implements the strict protection and management of forests in World Heritage sites and Biosphere Reserve sites.

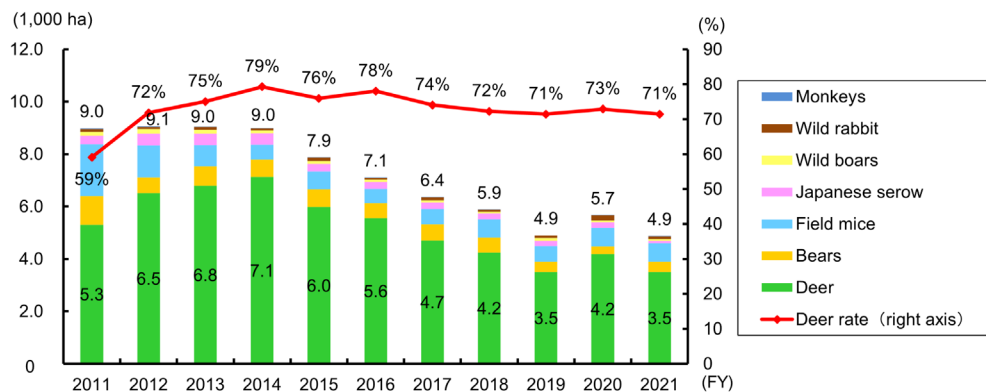
#### (4) Forest Damage by Wildlife, Pests and Forest Fire

Forest damage by wildlife is still serious though it is decreasing. In FY2021, about 4,900 ha of forests were damaged by wildlife, about 70% of which was caused by deer (Fig. I-6). The MAFF and Ministry of the Environment promote comprehensive measures including barrier fences installation and population control through capturing wildlife to prevent the damage.

Damage by pinewood nematode (*Bursaphelenchus xylophilus*) is the worst forest pest in Japan, although it is declining. In FY2021, pinewood nematode damaged about 260 thousand m<sup>3</sup> of trees. To prevent the spread of this pest, the Forestry Agency propagates pest-resistant seedlings, implements prevention measures with chemicals, and eradicates the nematode and mediating insects by logging and fumigation of affected trees.

In addition, damage by Japanese Oak Wilt, which is transmitted by *Platypus quercivorus*, is spreading. In FY2021, this pest damaged 150 thousand m<sup>3</sup> of trees in 42 prefectures. To prevent the spread of this pest, the Forestry Agency promotes the extermination of insects by fumigation of damaged trees and the prevention of insect invasion by applying adhesives to and covering with vinyl sheets on healthy trees.

In 2021, 1,227 forest fires occurred, burning down 789 ha of forest. Forest fires intensively occur in winter and spring, with most of the cases caused by people carelessly using fire.



Source: Survey by Forestry Agency

Fig. I-6 Area of forests damaged by major wildlife species

## 4. Addressing Global Policy Agenda

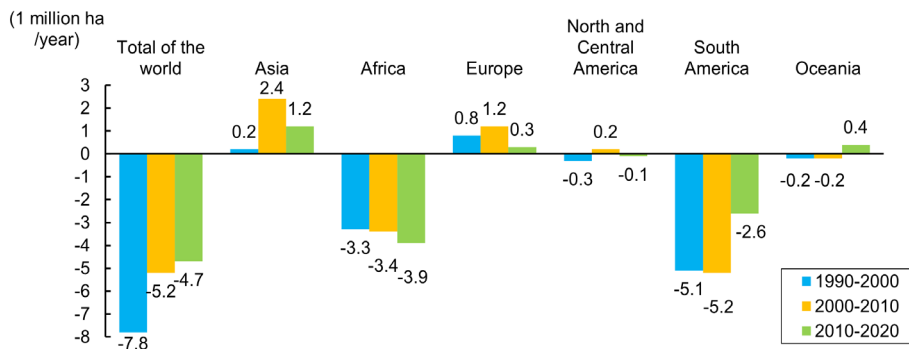
### (1) Promotion of Sustainable Forest Management

According to the Food and Agriculture Organization of the United Nations (FAO), the global forest area in 2020 is estimated at 4.06 billion ha, which is 31 % of the total land area. The world's forest area is still decreasing worldwide, especially in tropical forests in Africa and South America. The annual rate of forest loss in 2010-2020 is estimated at 4.7 million ha/year, but if the increase due to afforestation and forest expansion is not taken into account, the annual rate of forest loss is 10.2 million ha/year in 2015-2020 (Fig. I-7).

The GOJ promotes efforts toward sustainable forest management through participating in international dialogues on forests such as the United Nations Forum on Forests (UNFF), the FAO Committee on Forestry (COFO) and the Montreal Process.

In Japan, two forest certification schemes have been in place, one of which is run by the Forest Stewardship Council (FSC), an international organization, and the other is run by the Sustainable Green Ecosystem Council endorsed by Programme for the Endorsement of

Forest Certification schemes (SGEC/PEFC-J), which had been established as the domestic certification scheme in Japan, and was endorsed by the Programme for the Endorsement of Forest Certification (PEFC) in 2016. About 10% of forests in Japan are certified by FSC (about 0.42 million ha) and/or SGEC (about 2.21 million ha).



Source: Prepared by the Forestry Agency based on Global Forest Resources Assessment 2020 (FAO)

**Fig. I-7 Annual forest area net change by decade and region, 1990–2020**

## (2) Global Warming and Forests

Global warming is one of the most serious environmental problems. Adverse impacts caused by the rising global average temperature are causing concern.

To realize net-zero by 2050, the GOJ revised the Plan for Global Warming Countermeasures in October 2021, in which Japan's target for GHG reduction for FY2030 has been raised to 46% (compared to the total emissions in FY2013) and that for forest removals to approximately 2.7%.

Forest carbon sink measures are essential to achieve the targets. It is necessary to implement the forest management through thinning and reforestation using the "elite trees" and to promote wood use.

The GOJ has promoted “Reducing Emissions from Deforestation and Forest Degradation and the role of conservation, sustainable management of forests and enhancement of carbon stocks in developing countries” (REDD+), and adaptation measures based on the Climate Change Adaptation Plan (revised in October 2021, by the GOJ).

## (3) International Discussions on Biodiversity

The Kunming-Montreal Global Biodiversity Framework, new global targets for biodiversity by 2030, was adopted at the second part of COP15 held in December 2022.

## (4) International Cooperation

The GOJ contributes to the promotion of sustainable forest management in developing countries by providing technical cooperation and financial assistance by bilateral cooperation and multilateral cooperation through international bodies.

Japan’s technical cooperation is conducted as projects which optimally combine the “dispatch of experts”, “acceptance of training participants” and “provision of equipment”, and policy/technical training courses through the Japan International Cooperation Agency (JICA). Also, the GOJ provides financial support such as loans and grants through JICA: loans for promoting afforestation and reforestation projects and developing human resources, and grants for procurement of machinery and materials for forest management.

The GOJ also provides financial support to projects conducted by the International Tropical Timber Organization (ITTO) and FAO. In the projects, ITTO promotes sustainable domestic wood consumption in Indonesia and Thailand, in addition to Viet Nam and establishes timber legality framework in wood producing countries, and FAO promotes conservation and utilization of forests for enhancing community resilience to climate change in mountain watersheds of developing countries.



“Enhancing community resilience to climate change in mountain watersheds Project” was launched in 2020 with funding and dispatching staff from the Ministry of Agriculture, Forestry and Fisheries to the Food and Agriculture Organization of the United Nations (FAO) Headquarters. This project supports the evaluation of disaster risks in mountain watersheds, the survey and analysis of issues related to risk management through forest management and conservation, the development of teaching materials, and the holding of training programs. Furthermore, the project is also making efforts to disseminate the results worldwide.



GIS training workshop in the Philippines



Disaster risk workshop in Peru

## Chapter II

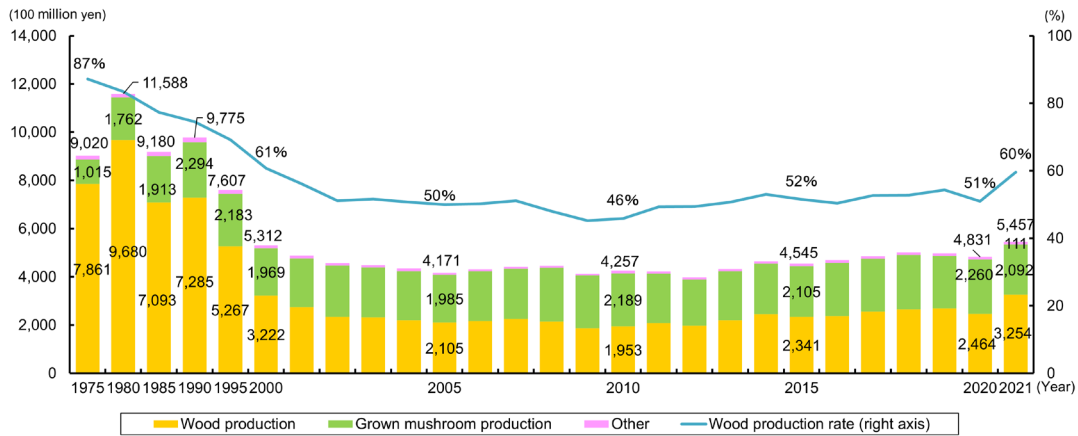
# Forestry and Rural Communities in Hilly and Mountainous Areas

## 1. Forestry

### (1) Forestry Production

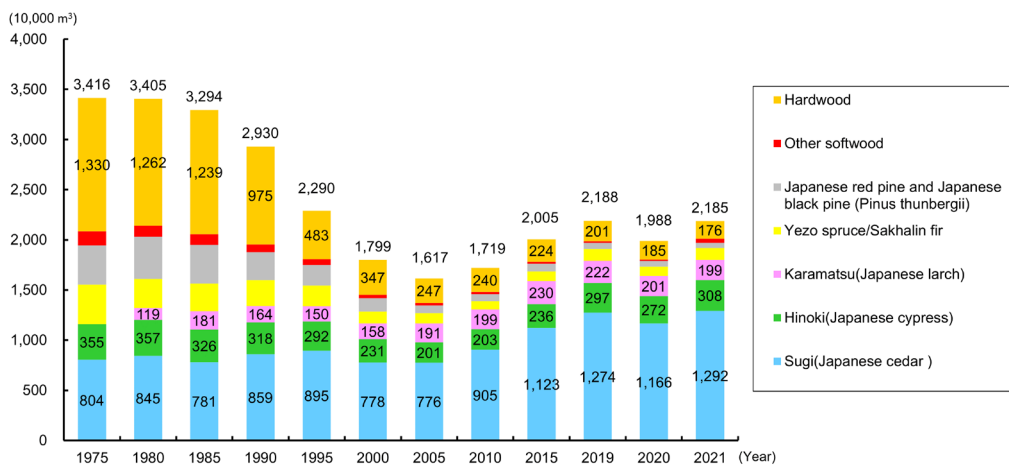
Total forestry output in 2021 was 545.7 billion yen, an increase of 13.0% from the previous year. Wood production accounted for about 60% of forestry output and reached 325.4 billion yen in 2021, which was an increase of 32.0% from the previous year (Fig. II-1).

Supply of domestic wood totaled 33.72 million m<sup>3</sup> in 2021. Of the supply, logs for sawn lumber, plywood and chips accounted for 21.85 million m<sup>3</sup>. By tree species, the volume of Sugi (Japanese cedar) production was 59.1%, Hinoki (Japanese cypress) 14.1%, Japanese larch 9.1%, and hardwood 8.1%, respectively (Fig. II-2).



Source: MAFF "Forestry output"

Fig. II-1 Gross forestry output



Source: MAFF "Report on supply and demand of lumber"

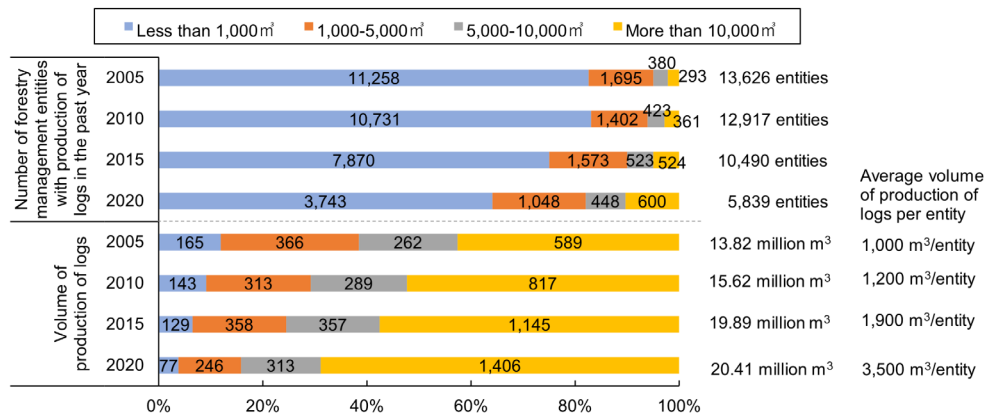
Fig. II-2 Domestic roundwood production



## (2) Forestry Management

The number of forestry households in 2020 was 690 thousand, 88% of which owned less than 10 ha of forest area. Small-scale forest ownership remains dominant.

The number of forestry management entities is about 34,000, significantly decreasing from about 200,000 in 2005. On the other hand, the average volume of log production per forestry management entity has increased. In addition, the proportion of log volume by entities with the annual log production of more than 10,000 m<sup>3</sup> has increased to 70%, indicating that the scale of entities is expanding (Fig. II-3).



Source: MAFF "Census of Agriculture and Forestry" (aggregate calculation after reclassification)

Fig. II-3 Number of forestry management entities by the scale of log production

Forest owners' cooperatives are the main players in forest management. Thus, it is necessary to strengthen their management base in terms of increasing profit return to forest owners and forestry workers.

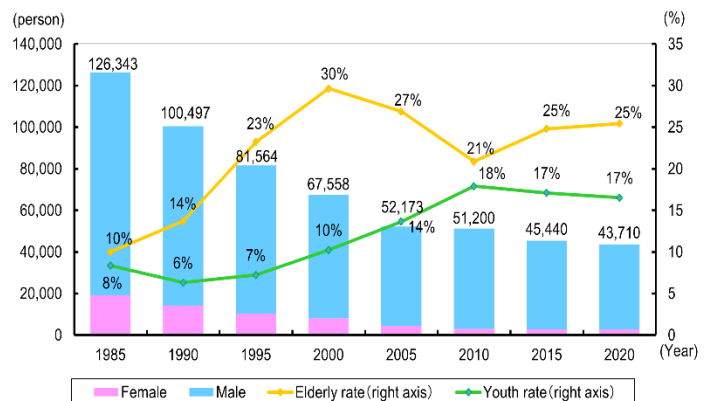
To strengthen the management skills of forestry management entities, the Forestry Agency has supported the development of "Forest Management Planners" who engage in selling woods strategically and sustainable forest management.

## (3) Forestry Workforce

The number of forestry workers in 2020 was 43,710, which leveled off after a long-term declining trend.

The proportion of young workers in forestry remains stable while that in all industries is on a declining trend (Fig. II-4).

Since the rate of occupational accidents in forestry is higher than in other industries, the Forestry Agency promotes safety patrol guidance to forestry management entities, and offers various training programs for forestry workers (Fig. II-5).

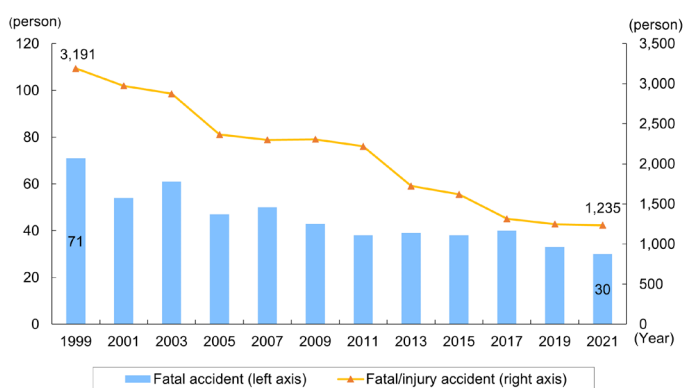


Source: Ministry of Internal Affairs and Communications "National Census"

- Notes: 1. "Elderly rate" reflects the rate of people aged 65 or over.  
2. "Youth rate" reflects the rate of people aged under 35.

Fig. II-4 Number of forestry workers

Permanent year-round employment rate of forestry workers is on a growing trend. On the other hand, the average annual salary for forestry workers is lower than in other industries. Therefore, the Forestry Agency is making efforts to improve their salary levels. Although the proportion of females engaged in forestry is lower than that of males (Fig. II-4), the opportunities that women play an active role such as the log production and forest surveys have increased due to the progress of the mechanization of forestry in recent years. In addition, some entities have developed the environments where women can work comfortably.



Source: Ministry of Health, Labour and Welfare "Report on Fatal Accidents" and "Report on occupational casualties"

**Fig. II-5 Number of occupational accidents in forestry**

#### **(4) Improvement of the Efficiency of Forestry Management**

##### **Consolidating Forestry Operation**

Since most private forests in Japan consist of small-scale forest owners, it is necessary to consolidate the forests of multiple owners and implement forestry operations integrally, such as developing forestry road systems and thinning, to improve productivity. The Forestry Agency encourages the operation through the Collective Forest Management Plan System, the Private Forest Management Entrustment System and the development of Forest Practice Planners.

Forest area registers that manage information on forest owners and ownership boundaries centrally are maintained in each municipality and forestry entities can receive such information from each municipality. Furthermore, "Forest Cloud System" which enables to share the forest information effectively is being introduced.

##### **Development of the New Forestry**

Based on the revised Basic Plan for Forest and Forestry, the Forestry Agency is promoting initiatives for the "New forestry" that utilizes new technologies to improve productivity and safety, which makes it possible to significantly improve profitability of forestry, from logging to reforestation and silviculture processes. Introducing of the "elite trees" and "Smart forestry", which utilize ICT and new technologies such as remotely operated machinery, is considered to be the key to realizing the "New forestry".

## **2. Non-timber Forest Products**

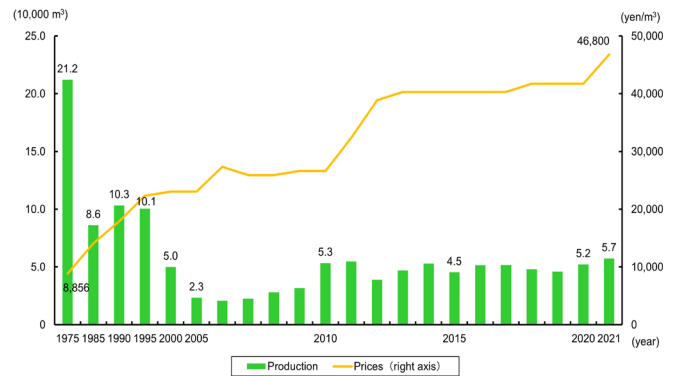
Non-timber forest products include variety of products such as mushrooms, edible nuts, wild vegetables, Japanese lacquer, bamboo, charcoal, and firewood. Non-timber forest products account for about 40% of the forestry output and play key roles in stimulating rural economies and ensuring employment. The value of non-timber forest products in 2021 was 260.8 billion yen, a decrease of 8.1% from the previous year.

### **(1) Mushrooms**

Mushrooms earned more than 80% of the value of non-timber forest products in 2021. Production of mushrooms has been flat in recent years, reaching 462,000 tons in 2021.

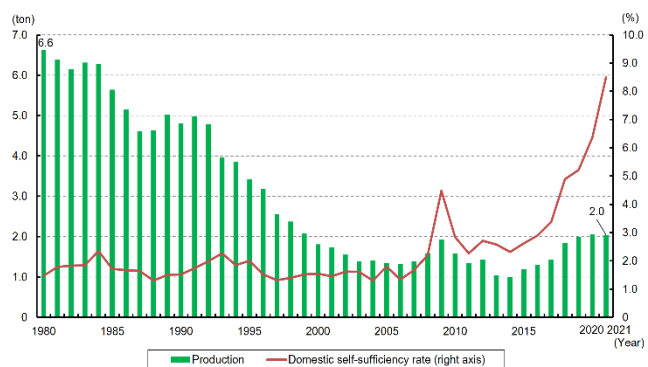
## (2) Other Non-timber Forest Products

Total production of charcoal has been decreasing over the long term, dropped to 17,000 tons in 2021. On the other hand, reflecting growing popularity of camping, total production of firewood for sale increased by 9.9 % from the previous year and amounted to 57,000 m<sup>3</sup> (Fig. II-6). Production of bamboo material was 28,000 tons in 2021, a decrease of 11.1% from the previous year. Production of domestically produced lacquer has been increasing in recent years since the Agency for Cultural Affairs announced a policy to use domestically produced lacquer in principle for the preservation and restoration of national treasure and important cultural property buildings in 2015. Against this background, domestic production in 2021 has recovered to approximately 2.0 tons, which correspond to 8.5% of total consumption (Fig. II-7).



Source: MAFF “Non-timber Forest Products Data”

Fig. II-6 Production and prices of firewood for sale



Source: MAFF “Non-timber Forest Products Data”

Fig. II-7 Production of Japanese lacquer

## 3. Rural Communities in Hilly and Mountainous Areas

### (1) Current State of Rural Communities in Hilly and Mountainous Areas

Rural communities in hilly and mountainous areas, where many people engage in forestry and other activities based on forest, play a significant role in securing the multiple functions of forests. “Mountain Village Areas Due for Development”, designated pursuant to the Mountain Villages Development Act, cover about half of Japan’s total land area, accounting for approximately 60% of the total forest area. These communities face several problems such as a decrease in job opportunities and an increase in abandoned farmland due to continuing depopulation and the aging population.

On the other hand, there has been increasing interest by urban residents and foreign tourists in abundant forests, clear water, landscape and culture in rural communities in hilly and mountainous areas.

### (2) Revitalization of Rural Communities in Hilly and Mountainous Areas

The MAFF has supported to discover local resources such as non-timber forest products, hardwood and *gibiers* (game meat) and to improve the added value of the resource, in addition to develop the forestry and wood industry by utilizing forest resources.

In recent years, there are new movements to use forest spaces in diverse fields such as

health promotion, tourism, and education as people change their lifestyles and diversify their values. The Forestry Agency has worked to create and promote the “Forest-related Service Industry” in these fields.

Wakayama Prefecture promotes migration to the forestry industry to secure new workers. The prefecture expands the base of prospective workers through information sessions in urban areas and dissemination of information using SNS and supports their work, housing, and daily life in cooperation with related organizations.

Additionally, the prefecture implements efforts to acquire forestry techniques before starting work at the Forestry Training Department of the Wakayama Prefectural College of Agriculture and Forestry.



2021 Seminar  
in Wakayama Prefecture



## Chapter III

# Wood Product Demand and Use of Wood

## 1. Supply and Demand for Wood

### (1) Global Wood Supply and Demand

In 2021, the global consumption of industrial roundwood increased by 2% from the previous year to 2,018 million m<sup>3</sup>.

The total volume of industrial roundwood imports in the world increased by 3% from the previous year to 143 million m<sup>3</sup>. China was the world's largest industrial roundwood importer in 2021, accounting for 44% of global imports of industrial roundwood.

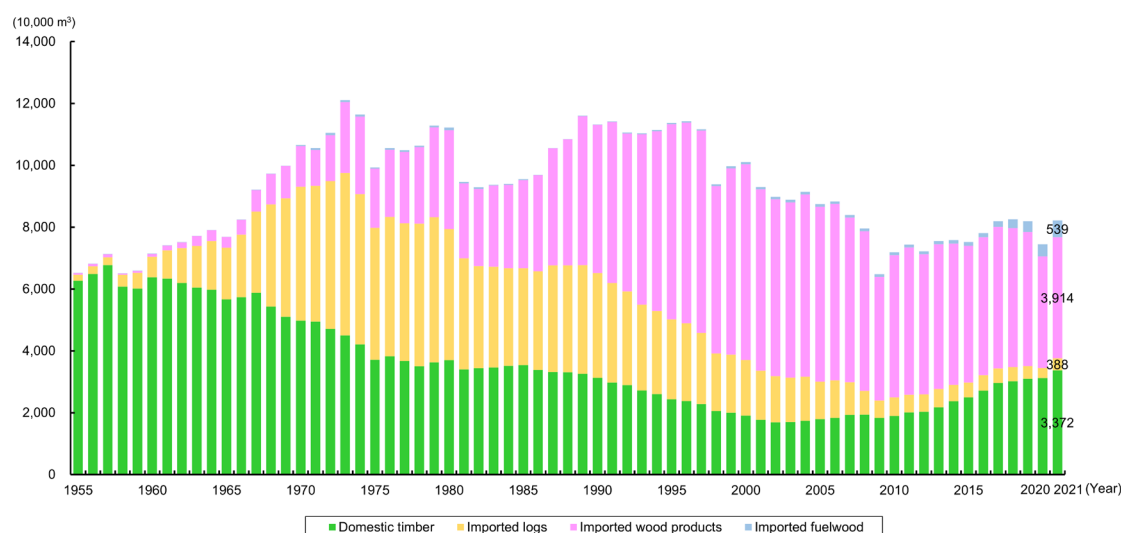
In 2021, the global production of sawn wood increased by 2% from the previous year to 494 million m<sup>3</sup>. The total volume of sawn wood imports in the world increased by 4% to 150 million m<sup>3</sup>. China was also the world's largest sawn wood importer in 2021, accounting for 22% of global imports of sawn wood.

### (2) Wood Supply and Demand in Japan

Japan's wood demand bottomed out in 2009 and has since recovered. The total wood product demand in Japan in 2021 was 82.13 million m<sup>3</sup> (roundwood equivalent), which was a 10.3% increase from the previous year.

The domestic wood supply bottomed out in 2002 and has since recovered. It was 33.72 million m<sup>3</sup> in 2021, which was an 8.3% increase from the previous year (Fig. III-1).

The volume of imported wood in 2021 was 48.41 million m<sup>3</sup>, which was an 11.8% increase from the previous year, due to an increase in the imports of wood products (Fig. III-1).



Source: Forestry Agency "Wood Supply and Demand Chart"

Fig. III-1 Wood supply in Japan

### (3) Wood Prices

The prices of domestic roundwood and sawn wood products increased significantly in 2021 due to a shortage of imported materials as the demand recovered with the post-COVID-19

economic recovery. The prices have been declining since 2022. On the other hand, domestic wood chip prices have been flat.

#### **(4) Addressing Illegal Logging**

The Clean Wood Act, enforced in 2017, stipulates that all business entities must endeavor to use legally harvested wood and wood products, and that Wood-related Business Entities in particular shall confirm the legality of the wood and wood products they handle.

Wood-related Business Entities that properly and reliably take measures for ensuring the use of legally harvested wood and wood products may apply to a registering organization to obtain registration as a “Registered Wood-related Business Entities”. As of March 2023, 609 entities have been registered.

To further encourage the distribution of legal wood, the GOJ submitted a revised proposal of the Clean Wood Act to the Diet in February 2023, where Wood-related Business Entities engaged in business, such as processing, exporting, and importing wood, are obligated to confirm the legality.

The GOJ supports the establishment of legal and sustainable supply chain in wood producing countries through the contribution to ITTO. Japan has joined the Experts Group on Illegal Logging and Associated Trade (EGILAT) of Asia-Pacific Economic Cooperation (APEC), which shares information and exchanges views regarding measures to combat illegal logging.

## **2. Wood Use**

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### **(1) Significance of Wood Use**

Wood use in buildings can store carbon absorbed by forests for a long time. Wood that is not suitable for material use can be utilized as a carbon-neutral energy source to replace fossil fuels.

Wood use in buildings contributes to reducing construction-related carbon dioxide emissions since wood consumes less energy than other materials during manufacturing and processing. In addition, wood provides a comfortable and healthy indoor environment since it has humidity control function, high thermal insulation properties, and positive physiological and psychological effects.

### **(2) Wood Use in Buildings**

In Japan, about 80% of low-rise (up to three stories) residential buildings are wooden on the basis of new building starts floor area. However, wooden buildings account for less than 10% of mid-to-high-rise (four stories and above) buildings and non-residential ones.

In recent years, as the technical and institutional environment for the use of wood has been developed to a certain extent, there is a growing number of leading examples of mid-to-high-rise and non-residential buildings with wooden structures (Fig. III-2). The Forestry Agency has been supporting the development of fire-resistant wooden materials and CLT in collaboration with other ministries and agencies. To further expand the use of wood, the public and private sectors are collaborating in examining challenges and solutions in wood use.



**Fig. III-2 Examples of wood use in buildings**

**(3) Use of Woody Biomass**

**Use for New Material**

High value-added products including lightweight, high-strength cellulose nanofibers (CNF) and heat-resistant, processible glycol lignin are being developed as ways to utilize woody biomass for materials. As for CNF, manufacturing facilities are under operation in various places, and some products using CNF have been put into practical use, including athletic shoes and paint.

Lignin is expected to be utilized for high-value-added materials, and development for applying glycol lignin to products is underway.

**Use for Energy**

The quantity of woody biomass for energy use has been increasing recently. Japan’s fuelwood consumption including wood chips, wood pellets, firewood, and charcoal in 2021 increased by 15.1% from the previous year to 14.74 million m<sup>3</sup>. The increase was mainly caused by a boom in woody biomass power plants.

The Forestry Agency is promoting the transportation and utilization of low-quality wood that has not been utilized. It is also encouraging heat-use and cogeneration, which has higher energy conversion efficiency.

**(4) Spread of the Use of Wood among Consumers**

The Forestry Agency has been promoting the Kizukai Undo (attention to wood use) initiative to disseminate the importance of wood use among consumers, including through the Japan Wood Design Award which acknowledges outstanding wood products and related activities that contribute to the re-discovery of the excellence and value of wood from the consumers’ viewpoints.

The Forestry Agency has also been promoting “Mokuiku” (wood use education) activities to disseminate the excellence and significance of wood use among both adults and children.

**3. Wood Industry**

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**(1) State of the Wood Industry**

The added value amount of lumber and the wood industry has been increasing in recent

years. In 2020, the value rose to 888 billion yen, which was an increase of 1.7% from the previous year.

## **(2) Strengthening the Competitiveness of the Wood Industry**

The scaling-up and consolidation of sawmills and plywood mills are progressing to stabilize the supply of products with reliable quality and performance at low cost in order to strengthen global competitiveness.

In order to strengthen local competitiveness of small and medium-sized sawmills, the Forestry Agency promotes their initiatives to produce a wide range of products, as well as to collaborate with local log producers, local builders, and other stakeholders to meet the needs of local communities.

In addition, it is essential to establish a supply system for Japanese Agricultural Standards (JAS) products of reliable quality and performance. The MAFF is working to rationalize the classification and criteria of the JAS in line with actual usage conditions, as well as supporting demonstrative use of JAS structural wood products.

## **(3) Development and Dissemination of Products and Technologies toward Utilization of Japan's Forest Resources**

The Forestry Agency is promoting; 1) the development and dissemination of milling and drying technologies for large-diameter logs, the supply of which is expected to increase as Japan's forest resources grow; 2) the standardization of dimensions of CLT panels and other wood materials and the technological development of fire-resistant wooden materials in order to expand the wood use in non-residential and mid-to-high-rise buildings; and 3) the development of new products, such as softwood floorboards with increased surface hardness in order to increase demand in the fields of renovation and furniture manufacturing.

## **(4) Each Sector of the Wood Industry**

### **Sawmilling Industry**

Shipments of sawn wood products have remained flat in recent years. In 2021, shipments rose to 9.09 million m<sup>3</sup>, which was an increase of 10.8% from the previous year. The quantity of industrial wood received by sawmills was 16.65 million m<sup>3</sup> in 2021.

### **Glued Laminated Timber Manufacturing Industry**

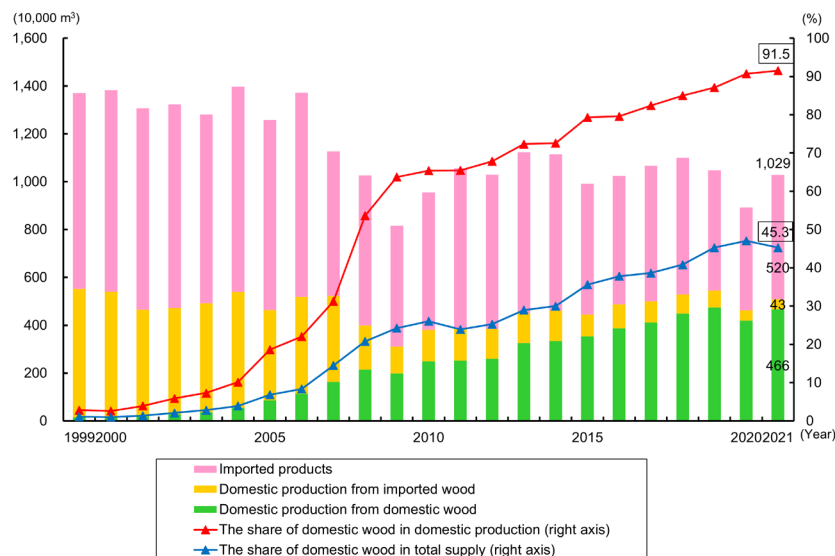
Glued laminated timber production in 2021 totaled 1.98 million m<sup>3</sup> of which structural use accounted for 1.90 million m<sup>3</sup>. Japan's import of glued laminated timber products in 2021 stood at 0.97 million m<sup>3</sup>.

### **Plywood Industry**

Production of plywood in 2021 was 3.17 million m<sup>3</sup>, which was an increase of 5.8% from the previous year. Most of this - 2.88 million m<sup>3</sup> - was for structural use, while 40 thousand m<sup>3</sup> was used as concrete formwork.

The share of domestic wood in domestic plywood production in 2021 rose to 91.5% (4.66 million m<sup>3</sup>). In 2021, the total wood supply for plywood, including imported products, was 10.29 million m<sup>3</sup>. Domestic wood accounted for 45.3% of total wood supply for plywood in Japan (Fig. III-3).





Source: Forestry Agency "Wood Supply and Demand Chart"

**Fig. III-3 Supply of wood for plywood**

### **Wood Chip Manufacturing Industry**

Production of wood chips (excluding fuel use chips) in 2021 was 6.07 million tons, which was an increase of 27.7% from the previous year.

Japan's import of wood chips in 2021 totaled 11.00 million tons, accounting for 64.4% of wood chip supply in Japan.

### **Particle Board and Fiberboard Industry**

Production of particle board in 2021 was 1.00 million m<sup>3</sup>, which was an increase of 4.4% from the previous year. Production of fiberboard in 2021 was 0.72 million m<sup>3</sup>, which was an increase of 3.6% from the previous year.

### **Precut Processing Industry**

"Precut lumber" refers to lumber that is pre-processed into the required shapes and sizes of building components, such as posts and beams, which enables quick and easy assembling of the components onsite.

The share of precut lumber in the lumber used for the post-and-beam construction method, which is one of the main construction methods for houses in Japan, reached 94.1% in 2021.

### **Wood Distribution Industry**

In the distribution of domestic logs in 2018, 41% was distributed through the timber market, 19% was sold to wood suppliers, while 40% was transported directly from logging sites to mills. The share of direct delivery has been increasing.

## 1. Roles of National Forests

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### (1) Distribution and Roles of National Forests

National forests occupy 7.58 million ha of land, which account for approximately 20% of the land area of Japan and approximately 30% of the total forest area. They are widely distributed in the remote mountainous areas and headwaters areas, and they play important roles in fulfillment of the multiple functions of forests, including land conservation and watershed conservation.

National Forests, which have diverse ecosystems such as planted forests and primeval natural forests, are a place for the growth and habitat of various wildlife including rare species. They also provide fields for health and recreation in forests.

### (2) National Forests Management

National forests, an important asset of the country, are managed by the Forestry Agency in an integrated manner under the National Forest Management Program.

## 2. Specific Initiatives under the National Forest Management Program

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### (1) Further Promotion of Management with Emphasis on Public Benefits

The Forestry Agency manages each national forest in accordance with the five forest types categorized based on the expected functions of “mountain disaster prevention”, “nature conservation”, “recreational use”, “comfortable environment development”, and “watershed conservation”.

Ninety percent of national forests are protection forests such as watershed conservation. The Forestry Agency improves devastated land and protection forests through forest conservation projects in order to ensure safe and secure life.

The Forestry Agency designates and manages “Protected Forests” and “Green Corridors” in order to conserve biodiversity. As of March 2022, Protected Forests were designated at 661 locations covering approximately 981,000 ha of land, which accounted for 12.9% of national forest area. “Green Corridors” were formed as of March 2022 at 24 locations, covering approximately 584,000 ha of land, and accounting for 7.7% of national forest area. The Forestry Agency takes measures to protect rare species of wildlife and prevents deer and other wildlife from damaging forests.

### (2) Contribution to Revitalizing Forest and Forestry

Through the organizations, technical capabilities and resources of the National Forest Management Program, the Forestry Agency is (I) developing and disseminating technologies for low-cost and effective forestry practices, such as utilization of containerized seedlings, drones and Information and Communication Technology (ICT) and an integrated harvesting and planting system; (II) establishing cooperative forest management areas to collaborate with private forests to promote development of forestry road systems and forest operations; and (III) promoting stable wood supply to lumber and plywood mills through “System Sales”.

In April 2020, the Timber Harvesting Rights System was enforced. Under this system,

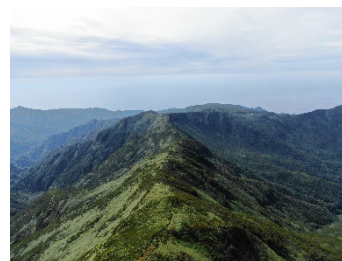
forestry management entities can acquire the right to steadily harvest trees in certain designated areas of national forests for a certain period, while ensuring multiple functions of the forest.



Primeval natural forests mainly composed of beech trees cover widely around the Kariba Mountains on the Oshima Peninsula in the southern part of Hokkaido.

The Forestry Agency designated the part of the area (approximately 2,732 ha) as the Forest Ecosystem Reserve in 1993.

After that, the Protected Forest management committee of Hokkaido National Forest Regional Office proposed to expand Protected Forests to breed black woodpeckers. In response, the Forestry Agency integrated the nearby Protected Forests and primeval beech forests surrounding them and newly designated the "Forest Ecosystem Reserve surrounding Mt. Kariba and Mt. Obira" (approximately 36,483 ha) in 2023.



Mt. Kariba  
Hokkaido Shimamaki Village  
Odanishikawa National Forest

### (3) National Forests as “Forests for People”

The Forestry Agency provides various organizations (e.g. schools, voluntary groups, corporations, traditional woodworkers) with places for field activities such as forest environmental education and forest management practices, by designating forests for such activities within national forests. The Forestry Agency also undertakes “model projects” to manage forests in cooperation with local parties and nature conservation groups.

The Forestry Agency leases national forests to local governments and residents.

“Recreation Forests” are managed and administered in partnership with municipalities and other stakeholders in local communities such as the tourist industry. In FY2021, a total of about 120 million people visited “Recreation Forests”.

And 93 of “Recreation Forests” that have potential attractiveness as tourism resources were selected as “Japan’s Forests with Breathtaking Views” (Fig. IV-1). To encourage more people to visit these forests, the Forestry Agency has provided information on web sites in English and has improved facilities by posting multilingual signs, and intensive environmental maintenance, such as facility repairs.



QR Code for “Japan’s Forests with Breathtaking Views” website



Poroto  
Recreation Forest

Tsurugisan  
Recreation Forest

Togakushi-Omine  
Recreation Forest

Kumamoto  
Recreation Forest

Shirakami-Sanchi -  
Annon Falls  
Recreation Forest

Source: Forestry Agency

Fig. IV-1 Examples of “Japan’s Forests with Breathtaking Views”

## Chapter V

# Reconstruction after the Great East Japan Earthquake

## 1. Recovery of Forests, Forestry and the Wood Industry

### (1) The Great East Japan Earthquake

On March 11, 2011, the Great East Japan Earthquake, the largest earthquake ever recorded in Japan, hit the eastern part of Japan. It caused a strong earth tremor over a broad area and brought a great tsunami which devastated entire coastal communities along the eastern coast of the Tohoku region.

In July 2011, the GOJ developed the fundamental reconstruction policy, titled the Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake, setting the timeframe for reconstruction at 10 years.

In March 2021, the GOJ established “Basic Guidelines for Reconstruction from the Great East Japan Earthquake After the “Reconstruction and Revitalization Period””.

### (2) Recovery of Forests

The Great East Japan Earthquake caused damages to forests and forest conservation facilities and forest roads in 15 prefectures. By FY2021, the recovery works had been completed.

Approximately 164 km of coastal disaster-prevention forests damaged by the tsunami required restoration work. The restoration work was completed on about 160km of them as of the end of March 2023. It is necessary to continue the project for growing the seedlings.

In May 2021, Iwate Prefectural Government and volunteers led by a local NPO completed tree planting in Takata Matsubara, Rikuzentakata City, Iwate Prefecture, which was damaged by the tsunami caused by the Great East Japan Earthquake.

The Prefectural Government and the NPO handle the management. The NPO is taking care of the planted area with its members and volunteers. In 2022, approximately 1,800 junior high and high school students in the prefecture participated in weeding around the growing pine trees.



Weeding in Takata Matsubara by junior high school students

(©The Association for the Preservation of Takatamatsubara)



### (3) Recovery of Forestry and the Wood Industry

The Great East Japan Earthquake damaged 115 wood processing/distribution facilities and 476 non-timber forest products facilities. Distribution of plywood materials and wood chips was disrupted as large-scale plywood and paper mills along the Pacific Coast were damaged.

The restoration of 98 wood processing/distribution facilities was completed by the end of March 2014, and their operations have restarted. The production of logs and wooden products has generally recovered to the respective levels before the earthquake.

#### (4) Promotion of Wood Use for Reconstruction and Contribution by Forests and Forestry

More than 25% (about 15,000) of “emergency temporary houses” were constructed with wood.

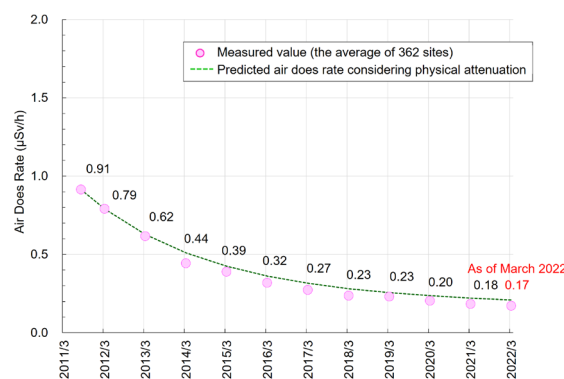
By the end of December 2020, approximately 25% of public housing built for disaster victims had been constructed with wood.

The use of wood has been promoted in the reconstruction of public buildings. Furthermore, woody biomass facilities such as power plants have been introduced in the disaster-affected prefectures, contributing to reconstruction.

## 2. Reconstruction after the Nuclear Accident

### (1) Measures against Radioactive Substances in Forests

Air dose rate in forests in Fukushima Prefecture has been declining year by year (Fig. V-1).



Source: Forest planning division of Fukushima Prefectural Government, *the current state and prediction of radioactive materials in forests (FY 2021)*

**Fig. V-1 Changes of Air Dose Rate in forests in Fukushima Prefecture**

The GOJ conducts monitoring and research about trends of distribution of radioactive substances within forests.

For decontamination of the forests, the measures in the vicinity of residence had been given top priority. Based on “Comprehensive Efforts towards the Regeneration of Forests and Forestry in Fukushima” (March 2016), the Forestry Agency is undertaking comprehensive projects to implement forest management such as thinning and to deal with radioactive substances, and projects to restore "satoyama forests" around residential areas.

For ensuring safety and security against radiation for forest workers, the Forestry Agency published a guidebook for forest workers in 2016.

To supply safe wood products to consumers, the Forestry Agency supports research and analysis on radioactive materials of wood products and the relevant work environment, and initiatives to develop arrangements for certifying the safety of wood products.

The Forestry Agency has launched the “Restoration of satoyama and hardwood forest project” in cooperation with people in Fukushima Prefecture and promotes the restoration of satoyama hardwood forest for shiitake mushroom logs. Municipalities have created a plan (a restoration plan) for restoring log forests that set out the area of log forests to be regenerated, the implementation system, and other related matters. They have implemented full-scale harvesting of hardwood forests since FY2022.

## **(2) Supply Safe Forest Products**

The GOJ set standard limits for radioactive substances in foods at 100 Bq/kg for general foods. As of March 30, 2023, 22 items of non-timber forest products have shipping restrictions.

The production of shiitake mushrooms on sawdust medium has recovered to almost the level before the Great East Japan Earthquake, but that on logs has not recovered even now.

The Forestry Agency has collected, analyzed, and provided information on the supply and demand of mushroom logs in response to the decrease in production volume in Fukushima Prefecture and other mushroom log production areas, which has affected log procurement in many prefectures.

The Forestry Agency established Guidelines Concerning Management of Log Cultivation of Mushrooms to Decrease Radioactive Cesium. Shipping restrictions on mushrooms are to be lifted when cultivation is managed based on this guideline and it has been determined that no mushrooms are produced whose radioactivity exceeds the standard limits. The Forestry Agency supports the maintenance of simple greenhouses and equipment for measuring radioactive substances, which are necessary for safe mushroom production.

Since 2021, if a system for properly managing and inspecting mushrooms and edible wild plants is developed under the shipping and inspection policy set by prefectures, it can be possible to ship the products which are confirmed not to exceed the limit for general foods by non-destructive inspection. As a result, the shipments of Matsutake mushrooms, unpeeled bamboo shoots have resumed in some restriction areas.

## Appendix

### 1. Forestry-related Fundamental Figures

Item	Unit	2000	2005	2010	2015	2017	2018	2019	2020	2021
i Nominal gross domestic product (GDP)	billion yen	535,418	532,516	505,531	538,032	553,073	556,630	557,911	539,082	549,379
Forestry	billion yen	176	137	196	234	243	249	248	231	263
Forestry / GDP	%	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.04	0.05
ii Total number of workers	million	64.46	63.56	62.57	64.01	65.30	66.64	67.24	66.76	66.67
Forestry	million	0.07	0.06	0.08	0.07	0.06	0.07	0.08	0.06	0.06
Forestry / Total # of workers	%	0.11	0.09	0.13	0.11	0.09	0.11	0.12	0.09	0.09
iii Land area of Japan	million ha	37.79	37.79	37.80	37.80	37.80	37.80	37.80	37.80	37.80
iv Forest	million ha	25.15	25.12	25.10	25.08	25.05	25.05	25.05	25.05	25.05
Forest / Land area	%	67.5	67.4	67.3	67.3	67.2	67.2	67.2	67.2	67.2
v Protection forest	million ha	8.93	11.65	12.02	12.17	12.20	12.21	12.23	12.25	12.26
Protection forest / Forest	%	35.5	46.4	47.9	48.5	48.7	48.7	48.8	48.9	48.9
vi Growing stock of forest	billion m <sup>3</sup>	3.5	4.0	4.4	4.9	5.2	5.2	5.2	5.2	5.2
vii Total wood supply/demand	million m <sup>3</sup>	101.01	87.42	71.88	75.16	81.85	82.48	81.91	74.44	82.13
Domestic production	million m <sup>3</sup>	19.06	17.90	18.92	24.92	29.66	30.20	30.99	31.15	33.72
Import	million m <sup>3</sup>	81.95	69.52	52.96	50.24	52.19	52.28	50.92	43.29	48.41
Self-sufficiency rate	%	18.9	20.5	26.3	33.2	36.2	36.6	37.8	41.8	41.1
viii New housing starts	million units	1.23	1.24	0.81	0.91	0.96	0.94	0.91	0.82	0.86
Proportion of wooden structure	%	45.2	43.9	56.6	55.5	56.5	57.2	57.8	57.6	58.7

Sources i: Cabinet Office "Annual Report on National Accounts for 2021"

ii: Ministry of Internal Affairs and Communications "Annual Report on the Labour Force Survey"

iii: Geospatial Information Authority of Japan "The Report of Statistical reports on the land area by prefectures and municipalities in Japan"

iv, v, vi: Forestry Agency

vii: Forestry Agency "Wood Supply and Demand Chart"

viii: Ministry of Land, Infrastructure, Transport and Tourism "Housing Starts"

Note "Total wood supply/demand", "Domestic production" and "Import" in "vii" refer to the volume in roundwood equivalent.

### 2. Forestry Output

(Unit: billion yen)

Item	2000	2005	2010	2015	2017	2018	2019	2020	2021
Forestry output	531.15	417.05	425.70	454.47	486.02	501.73	497.28	483.06	545.66
Wood production	322.18	210.50	195.29	234.08	256.09	264.83	270.00	246.43	325.41
Softwood	265.33	177.41	170.16	198.19	206.06	209.99	213.01	179.02	251.70
Sugi (Japanese cedar)	123.78	87.53	93.50	118.09	122.68	126.44	127.43	107.39	147.26
Hardwood	54.72	31.71	23.76	19.51	18.40	18.42	16.95	15.82	15.25
Firewood and charcoal production	6.16	6.09	5.08	5.31	5.44	5.54	5.81	5.96	6.23
Grown mushroom production	196.89	198.50	218.91	210.52	219.76	225.37	216.67	225.96	209.16
Minor forestry products production	5.92	1.96	6.42	4.55	4.74	5.99	4.80	4.71	4.86
Forestry income produced	351.91	245.78	229.22	251.02	269.40	266.45	264.35	253.57	286.45

Source Ministry of Agriculture, Forestry and Fisheries (MAFF) "Forestry Output"

Notes 1. "Wood production" includes the output of wood chips for fuel since 2011.

2. "Softwood" in wood production includes output of other softwood and wood for pulp.

3. "Firewood and charcoal production" includes the output of bamboo charcoal and charcoal dust since 2001.

4. "Grown mushroom production" includes the output of eryngii mushrooms and other varieties of grown mushrooms since 2001.

5. "Minor forestry products production" includes the output of Japan wax and Japanese lacquer since 2002,

the output of wild grass (wild vegetables and wild herbs) since 2010 and the output of gibier since 2016.

6. Due to rounding, some totals may not correspond with the sum of the separate figures.

### 3. Current State of Forest Resources

(Unit: 1,000 ha, million m<sup>3</sup>)

Classification		Total		Standing timber area (canopy cover more than 30%)				Treeless land (canopy cover less than 30%)		Bamboo groves	
				Planted forest		Natural forest		Area	Growing stock		
		Area	Growing stock	Area	Growing stock	Area	Growing stock				Area
Total		25,048	5,241.50	10,204	3,308.42	13,481	1,932.45	1,197	0.64	167	
National forest	Subtotal	7,659	1,225.93	2,288	513.04	4,733	712.45	637	0.44	0	
	Under the Forestry Agency's jurisdiction	Subtotal	7,593	1,220.72	2,282	512.03	4,682	708.24	629	0.44	0
		State-owned	7,508	1,201.28	2,208	492.83	4,680	708.01	620	0.44	0
		Government reforestation	85	19.44	73	19.21	2	0.23	10	0	-
		Other	0	0	-	-	-	-	0	0	-
Under other Agencies' jurisdiction	65	5.21	7	1.00	51	4.20	8	-	0		
Private and public forest	Subtotal	17,389	4,015.57	7,916	2,795.38	8,747	1,220.00	560	0.19	167	
	Public forest	Subtotal	2,995	615.56	1,334	397.05	1,531	218.36	124	0.15	6
		Prefecture	1,292	252.69	529	145.59	709	107.01	53	0.09	1
		Municipality/Property ward	1,702	362.87	804	251.47	822	111.35	71	0.06	5
	Private forest	14,347	3,394.33	6,569	2,395.55	7,188	998.74	431	0.04	158	
Others	48	5.68	13	2.78	28	2.90	5	0	3		

Source Forestry Agency

Notes 1. Data cover the forests defined in Article 2 of the Forest Act.

2. "Others" refers to forests that are not subject to the "Regional Forest Plans" for non-national forest under Article 5 of the Forest Act, and for national forest under Article 7-2 of the Forest Act.

3. Figures are as of March 31, 2017.

4. Symbol of "-" means "not applicable".

5. Due to rounding, some totals may not correspond with the sum of the separate figures.

### 4. Planted Area by Tree Species

(Unit: ha)

	Total	Softwood					Hardwood
		Sugi (Japanese cedar)	Hinoki (Japanese cypress)	Matsu (Pine)	Karamatsu (Japanese larch)	Other	
2000	(31,316)	(8,223)	(11,574)	(233)	(2,524)	(4,954)	(3,808)
	28,480	7,967	10,745	223	2,493	4,014	3,038
2005	(25,584)	(5,216)	(7,096)	(226)	(3,534)	(5,728)	(3,784)
	22,498	5,011	6,307	183	3,423	4,611	2,963
2010	(18,756)	(4,132)	(2,820)	(247)	(4,604)	(4,265)	(2,688)
	16,388	3,844	2,262	237	4,418	3,381	2,246
2015	(19,429)	(5,537)	(2,039)	(185)	(4,467)	(5,250)	(1,950)
	16,607	5,390	1,930	168	4,027	3,450	1,642
2017	(22,069)	(7,102)	(1,979)	(406)	(5,388)	(5,423)	(1,771)
	19,866	6,845	1,874	388	5,179	4,110	1,471
2018	(21,568)	(6,899)	(1,845)	(277)	(5,486)	(5,106)	(1,956)
	19,340	6,597	1,760	272	5,165	3,799	1,747
2019	(22,788)	(7,189)	(1,821)	(311)	(6,466)	(5,046)	(1,954)
	20,562	7,005	1,745	308	6,139	3,692	1,673
2020	(22,777)	(7,571)	(1,894)	(309)	(6,681)	(4,412)	(1,910)
	20,686	7,359	1,738	294	6,198	3,445	1,653
2021	(23,015)	(8,207)	(2,230)	(249)	(6,662)	(3,760)	(1,906)
	20,266	7,477	1,798	210	6,271	2,901	1,609

Source Forestry Agency

Notes 1. Figures do not include national forest.

2. Figures in parentheses refer to the total area which includes area planted as lower layer of multi-layered forest.



## 5. Planted Forest Area by Age Classes

(Unit: 1,000 ha)

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX
1985	604	895	1,263	1,691	1,762	1,569	947	337	240	205	178	137	111	83	148					
1989	436	700	943	1,351	1,691	1,746	1,413	777	270	224	183	151	118	93	79	52	62			
1994	278	421	699	937	1,336	1,686	1,719	1,388	735	262	213	172	139	112	86	67	105			
2001	131	226	350	589	874	1,149	1,599	1,677	1,522	946	353	204	171	144	112	89	62	52	70	
2006	88	168	227	352	593	873	1,143	1,582	1,649	1,500	918	345	200	168	141	106	90	62	120	
2011	73	114	159	231	347	584	852	1,111	1,565	1,631	1,473	921	345	194	164	138	105	87	174	
2016	68	102	114	164	224	348	582	846	1,108	1,529	1,592	1,428	893	340	190	162	135	104	86	172

Source Forestry Agency

Notes 1. Figures are as the end of each fiscal year.

2. For the year 1985, the class XV contains forests older than that class. For the years 1989 and 1994, the class XVII contains forests older than that class. For the years 2001, 2006 and 2011, the class XIX contains forests older than that class. For the year 2016, the class XX contains forests older than that class.

3. Data cover the forests defined in Article 5 or Article 7-2 of the Forest Act.

## 6. Thinned Area and Use of Thinnings

(FY)	Thinned area (1,000 ha)			Volume of thinnings used (million m <sup>3</sup> )					
	Total	Private and public forest	National forest	Total	Private and public forest			National forest	
					Subtotal	Sawnwood	Roundwood		Others
2010	556	445	110	6.65	4.43	2.70	0.42	1.31	2.22
2012	488	368	121	7.59	5.21	3.00	0.36	1.86	2.38
2013	521	400	121	8.11	5.65	3.23	0.44	1.97	2.46
2014	465	339	126	7.69	5.21	2.91	0.33	1.97	2.47
2015	452	341	112	8.13	5.65	2.97	0.35	2.32	2.48
2016	440	319	121	8.23	5.76	2.95	0.30	2.51	2.47
2017	410	304	106	8.12	5.56	2.75	0.28	2.53	2.56
2018	370	269	101	7.46	4.94	2.37	0.25	2.32	2.52
2019	365	268	98	7.68	5.21	2.53	0.30	2.37	2.47
2020	357	261	96	7.29	4.79	2.26	0.28	2.25	2.50
2021	365	269	96	7.82	5.00	2.45	0.30	2.25	2.82

Source Forestry Agency

Notes 1. Volumes are in roundwood equivalent.

2. "Sawnwood" means the wood such as wood building materials and wood packaging materials.

3. "Roundwood" means the wood such as scaffolding timber and stakes.

4. "Others" includes the wood such as wood chip and wood powder (sawdust).

5. Due to rounding, some totals may not correspond with the sum of the separate figures.

## 7. Forest Area by Owners

	2015		2020	
	Forest area (ha)	Proportion of total area (%)	Forest area (ha)	Proportion of total area (%)
Total	17,626,761	100.0	17,616,863	100.0
Private	13,563,827	77.0	13,560,696	77.0
Public	3,370,380	19.1	3,407,898	19.3
Prefecture	1,271,571	7.2	1,310,110	7.4
Public corporation	391,189	2.2	351,519	2.0
Municipality	1,406,063	8.0	1,434,838	8.1
Property ward	301,557	1.7	311,431	1.8
Incorporated Administrative Agencies	692,554	3.9	648,269	3.7

Source MAFF "Census of Agriculture and Forestry"

Notes 1. Due to rounding, some totals may not correspond with the sum of the separate figures.

2. "Incorporated Administrative Agencies" include Independent Administrative Agencies, National University Corporations and Special Corporations.

## 8. Number of Forestry Management Entities and their Forest Areas (Unit: entity, ha)

	Total		Less than 3 ha		3-5 ha		5-20 ha		20-50 ha		50-100 ha		100 ha or more	
	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area	Number	Area
Total	34,001	3,322,691	1,520	628	6,236	22,979	15,220	148,280	6,045	176,477	2,151	142,598	2,829	2,831,728
Corporation	4,093	1,245,256	983	210	201	757	765	8,398	611	19,542	423	29,441	1,110	1,186,908
Private company	1,994	663,822	656	114	90	322	372	3,868	270	8,221	143	9,562	463	641,736
Cooperative	1,608	314,120	271	87	65	256	268	3,229	267	8,842	229	16,117	508	285,588
Agricultural cooperative	47	15,354	-	-	1	3	4	40	8	298	4	283	30	14,730
Forest owners' cooperative	1,388	212,763	238	87	51	198	229	2,751	234	7,702	209	14,682	427	187,343
Other cooperatives	173	86,003	33	-	13	55	35	438	25	842	16	1,152	51	83,516
Other corporations	491	267,314	56	8	46	179	125	1,301	74	2,480	51	3,763	139	259,583
Non-corporation	29,080	723,038	536	417	6,031	22,207	14,399	139,244	5,374	154,949	1,648	107,263	1,092	298,959
Individual	27,776	616,223	494	398	5,883	21,634	13,940	134,299	5,093	146,131	1,484	95,694	882	218,067
Public	828	1,354,397	1	1	4	15	56	638	60	1,986	80	5,894	627	1,345,862

Source MAFF "2020 Census of Agriculture and Forestry"

Notes 1. The symbol "-" means "not applicable".

2. "Forestry management entities" corresponds to one of the followings. The entities (I) own more than 3 hectares of forest, and also have conducted forestry or have established a "Forest Management Plan" for the past five years, (II) have been entrusted with forestation or (III) have harvested more than 200 m<sup>3</sup> of logs for the past one year through the entrustment and the purchase of standing trees.

## 9. Roundwood Production (Unit: 1,000 m<sup>3</sup>)

		2000	2005	2010	2015	2017	2018	2019	2020	2021	Relative change from the previous year (%)
Total		17,034	16,166	17,193	20,049	21,408	21,640	21,883	19,882	21,847	9.9
By tree species	Subtotal	13,707 (80)	13,695 (85)	14,789 (86)	17,815 (89)	19,258 (90)	19,462 (90)	19,876 (91)	18,037 (91)	20,088 (92)	11.4
	Sugi (Japanese cedar)	7,671	7,756	9,049	11,226	12,276	12,532	12,736	11,663	12,917	10.8
	for sawnwood	7,258 <57>	6,737 <58>	6,695 <63>	7,869 <66>	8,200 <65>	8,237 <66>	8,582 <67>	7,841 <68>	8,630 <67>	10.1
	Hinoki (Japanese cypress)	2,273	2,014	2,029	2,364	2,762	2,771	2,966	2,722	3,079	13.1
	Akamatsu (Japanese red pine), Kuromatsu (Japanese black pine)	1,034	783	694	779	641	628	601	570	529	▲ 7.2
	Karamatsu (Japanese larch), Ezomatsu (Yezo spruce), Todomatsu (Sakhalin fir)	2,410	2,910	2,816	3,268	3,380	3,366	3,405	2,940	3,183	8.3
	Other	319	232	201	170	198	165	168	142	380	167.6
	Hardwood	3,327 (20)	2,471 (15)	2,404 (14)	2,236 (11)	2,153 (10)	2,178 (10)	2,007 (9)	1,845 (9)	1,759 (8)	▲ 4.7
By use	Sawnwood	12,798 (75)	11,571 (72)	10,582 (62)	12,004 (60)	12,632 (59)	12,563 (58)	12,875 (59)	11,615 (58)	12,861 (59)	10.7
	Plywood	138 (1)	863 (5)	2,490 (14)	3,356 (17)	4,122 (19)	4,492 (21)	4,745 (22)	4,195 (21)	4,661 (21)	11.1
	Chips	4,098 (24)	3,732 (23)	4,121 (24)	4,689 (23)	4,654 (22)	4,585 (21)	4,263 (19)	4,072 (20)	4,325 (20)	6.2

Source MAFF "Wood Supply and Demand Report"

Notes 1. Figures in parentheses refer to the percentage of each to total volume.

2. Figures in angle brackets refer to the percentage of Sugi for sawnwood to the volume for sawnwood of all species.

3. Roundwood Production excludes forest residue.

4. Total figures is the sum of "Sawnwood", "Plywood", and "Chips".

5. Due to rounding, some totals may not correspond with the sum of the separate figures.

6. Production of roundwood for LVL is added to "Plywood" since 2017.

### 10. Wood Supply and Demand Chart (roundwood equivalent)

(Unit: 1,000 m<sup>3</sup>)

Supply	Demand				Domestic consumption				Export											
	Total	Subtotal	Sawwood	Pulp and chips	Other	Wood for mushroom production	Fuel wood	Total	Subtotal	Sawwood	Plywood	Pulp and chips	Other	Subtotal	Charcoal	Firewood	Wood chips for fuel			
Total	(20,065)	(7,210)	26,179	10,294	(7,210)	246	(12,855)	(20,065)	(7,210)	25,844	10,056	27,529	466	3,247	1,459	335	1,214	2		
Roundwood	(7,210)	(7,210)	16,276	5,093	4,600	1,877		(7,210)	(7,210)	15,941	4,856	3,385	416	3,247	1,459	335	1,214	2		
Forest residue	161	161			161			161	161											
Import	39,136	39,136	9,903	5,201	23,983	49		39,136	39,136	9,903	5,201	23,983	49							
Wood for mushroom production	246					246		246												
Fuel wood	(12,855)						(12,855)	(12,855)												
Total	33,721	24,127	12,861	4,661	4,744	1,862	30,476	20,886	12,526	4,430	3,529	401	246	3,241	1,459	335	1,214	2	2	
Roundwood	23,966	23,966	12,861	4,661	4,583	1,862	20,725	20,725	12,526	4,430	3,368	401		3,241	1,459	335	1,214	2	2	
Forest residue	161	161			161		161	161												
Wood for mushroom production	246					246	246	246					246							
Fuel wood	9,348						9,348	9,344												
Total	48,409	43,015	13,318	5,633	24,000	65	48,403	43,009	13,318	5,627	24,000	65	5,394	6	6	0	6			
Roundwood	3,879	3,879	3,415	432	17	15	3,873	3,873	3,415	426	17	15		6	6	0	6			
Subtotal	39,136	39,136	9,903	5,201	23,983	49	39,136	39,136	9,903	5,201	23,983	49								
Sawwood	9,903	9,903	9,903				9,903	9,903	9,903											
Plywood	5,201	5,201		5,201			5,201	5,201	5,201											
Pulp	4,799	4,799		4,799			4,799	4,799			4,799									
Chips	19,184	19,184		19,184			19,184	19,184			19,184									
Other	49	49				49	49	49												
Fuel wood	5,394						5,394	5,394						5,394	676	4	4,714			

Source: Forestry Agency "Wood Supply and Demand Chart", 2021

- Notes: 1. Figures in parentheses of the volume of pulp and chips and fuel wood, for example wood chips from mill residue or construction waste, are not included in the "total" and "subtotal".  
 2. "Forest residue" refers to branches or roots carried into mills for use.  
 3. Due to rounding, some totals may not correspond with the sum of the separate figures.

## 11. Wood Supply/Demand (roundwood equivalent)

(Unit: 1,000 m<sup>3</sup>)

	Wood supply/demand				Wood demand for industrial use by sector				Wood supply for industrial use by source	
	Total	Wood for industrial use	Fuel wood	Wood for mushroom production	Sawnwood	Plywood	Pulp and chips	Others	Domestic production	Import (roundwood and wood products)
1955	65,206	45,278	19,928	...	30,295	2,297	8,285	4,401	42,794	2,484
1960	71,467	56,547	14,920	...	37,789	3,178	10,189	5,391	49,006	7,541
1965	76,798	70,530	6,268	...	47,084	5,187	14,335	3,924	50,375	20,155
1970	106,601	102,679	2,348	1,574	62,009	13,059	24,887	2,724	46,241	56,438
1975	99,303	96,369	1,132	1,802	55,341	11,173	27,298	2,557	34,577	61,792
1980	112,211	108,964	1,200	2,047	56,713	12,840	35,868	3,543	34,557	74,407
1985	95,447	92,901	572	1,974	44,539	11,217	32,915	4,230	33,074	59,827
1990	113,242	111,162	517	1,563	53,887	14,546	41,344	1,385	29,369	81,793
1995	113,698	111,922	721	1,055	50,384	14,314	44,922	2,302	22,916	89,006
2000	101,006	99,263	940	803	40,946	13,825	42,186	2,306	18,022	81,241
2005	87,423	85,857	1,001	565	32,901	12,586	37,608	2,763	17,176	68,681
2010	71,884	70,253	1,099	532	25,379	9,556	32,350	2,968	18,236	52,018
2015	75,160	70,883	3,962	315	25,358	9,914	31,783	3,829	21,797	49,086
2017	81,854	73,742	7,800	311	26,370	10,667	32,302	4,403	23,312	50,430
2018	82,478	73,184	9,020	274	25,708	11,003	32,009	4,465	23,680	49,505
2019	81,905	71,269	10,386	251	25,270	10,474	31,061	4,464	23,805	47,464
2020	74,439	61,392	12,805	242	24,597	8,919	26,064	1,812	21,980	39,412
2021	82,130	67,142	14,742	246	26,179	10,294	28,743	1,926	24,127	43,015

Source Forestry Agency "Wood Supply and Demand Chart"

- Notes 1. "Others" includes items such as roundwood for export.  
 2. The symbol "... " means "unknown or lack of investigation".  
 3. Due to rounding, some totals may not correspond with the sum of the separate figures.  
 4. "Fuel wood" includes wood chip for fuel utilized by woody biomass power plants since 2014.

## 12. Trend of Domestic and Imported Wood Supply/Demand (roundwood equivalent)

(Unit: 1,000 m<sup>3</sup>)

		2000	2005	2010	2015	2017	2018	2019	2020	2021	Relative change from the previous year (%)	
		Total wood supply/demand		101,006	87,423	71,884	75,160	81,854	82,478	81,905	74,439	82,130
Wood for industrial use		99,263	85,857	70,253	70,883	73,742	73,184	71,269	61,392	67,142	9.4	
Fuel wood		940	1,001	1,099	3,962	7,800	9,020	10,386	12,805	14,742	15.1	
Wood for mushroom production		803	565	532	315	311	274	251	242	246	1.7	
Domestic production		19,058	17,899	18,923	24,918	29,660	30,201	30,988	31,149	33,721	8.3	
Import		81,948	69,523	52,961	50,242	52,194	52,277	50,917	43,290	48,409	11.8	
Self-sufficiency rate (%)		18.9	20.5	26.3	33.2	36.2	36.6	37.8	41.8	41.1	▲ 0.7	
Wood demand for industrial use by sector	Total	99,263	85,857	70,253	70,883	73,742	73,184	71,269	61,392	67,142	9.4	
	Domestic production	18,022	17,176	18,236	21,797	23,312	23,680	23,805	21,980	24,127	9.8	
	Import	81,241	68,681	52,018	49,086	50,430	49,505	47,464	39,412	43,015	9.1	
	Self-sufficiency rate (%)	18.2	20.0	26.0	30.8	31.6	32.4	33.4	35.8	35.9	0.1	
		Subtotal	40,946	32,901	25,379	25,358	26,370	25,708	25,270	24,597	26,179	6.4
	Sawnwood	Domestic production	12,798	11,571	10,582	12,004	12,632	12,563	12,875	11,615	12,861	10.7
		Import	28,148	21,330	14,797	13,354	13,738	13,145	12,395	12,982	13,318	2.6
		Self-sufficiency rate (%)	31.3	35.2	41.7	47.3	47.9	48.9	51.0	47.2	49.1	1.9
	Plywood	Subtotal	13,825	12,586	9,556	9,914	10,667	11,003	10,474	8,919	10,294	15.4
		Domestic production	138	863	2,490	3,530	4,122	4,492	4,745	4,195	4,661	11.1
		Import	13,687	11,723	7,066	6,384	6,545	6,511	5,729	4,724	5,633	19.2
	Self-sufficiency rate (%)	1.0	6.9	26.1	35.6	38.6	40.8	45.3	47.0	45.3	▲ 1.7	
	Pulp and chips	Subtotal	(6,537)	(7,974)	(6,192)	(6,667)	(7,107)	(6,792)	(6,258)	(5,634)	(7,210)	28.0
		Domestic production	42,186	37,608	32,350	31,783	32,302	32,009	31,061	26,064	28,743	10.3
		Import	4,749	4,426	4,785	5,202	5,193	5,089	4,651	4,420	4,744	7.3
Self-sufficiency rate (%)	37.437	33.181	27.565	26.581	27.110	26.920	26.410	21,644	24,000	10.9		
Self-sufficiency rate (%)	11.3	11.8	14.8	16.4	16.1	15.9	15.0	17.0	16.5	▲ 0.5		
Others	Subtotal	2,306	2,763	2,968	3,829	4,403	4,465	4,464	1,812	1,926	6.3	
	Domestic production	337	316	379	1,061	1,365	1,536	1,534	1,750	1,862	6.4	
	Import	1,969	2,447	2,589	2,767	3,038	2,930	2,931	62	65	4.8	
Self-sufficiency rate (%)	14.6	11.4	12.8	27.7	31.0	34.4	34.4	96.6	96.6	0.0		

Source Forestry Agency "Wood Supply and Demand Chart"

- Notes 1. Self-sufficiency rate is calculated by domestic production divided by total or subtotal in each category.  
 2. "Others" includes items such as roundwood for export.  
 3. Figures in parentheses refer to the volume of wood chip from mill residue or construction waste. They are not included in the "total" and "subtotal".  
 4. Due to rounding, some totals may not correspond with the sum of the separate figures.  
 5. "Fuel wood" includes wood chip for fuel utilized by woody biomass power plants since 2014.  
 6. Among "relative change from the previous year", "self-sufficiency rate" field is the difference from the previous year.

### 13. Wood Supply by Country (roundwood equivalent)

(Unit: 1,000 m<sup>3</sup>, %)

			2000	2005	2010	2015	2017	2018	2019	2020	2021
Imported wood	North America	Subtotal	(28.9) 28,700	(18.8) 16,129	(19.2) 13,506	(17.5) 12,415	(16.8) 12,352	(16.3) 11,898	(15.3) 10,893	(14.8) 9,068	(14.6) 9,835
		U.S.A	14,460	6,844	5,838	6,057	6,233	6,273	5,754	5,488	5,590
		Canada	14,240	9,285	7,668	6,359	6,119	5,625	5,139	3,580	4,245
	Southeast Asia	Subtotal	(13.7) 13,569	(12.2) 10,511	(8.9) 6,287	(8.3) 5,848	(7.8) 5,751	(7.4) 5,421	(6.9) 4,949	(6.9) 4,215	(6.7) 4,504
		Malaysia	6,690	5,888	3,773	2,917	2,778	2,514	2,213	1,771	1,820
		Indonesia	5,858	4,137	2,304	2,804	2,887	2,759	2,548	2,333	2,625
		Others	1,021	486	209	127	85	148	187	111	59
	Russia Federation		(7.5) 7,429	(8.6) 7,411	(3.3) 2,343	(2.9) 2,081	(3.3) 2,398	(3.3) 2,411	(3.5) 2,459	(3.3) 2,050	(3.3) 2,202
	Europe		(4.7) 4,675	(6.9) 5,937	(7.1) 4,967	(7.6) 5,374	(8.7) 6,450	(8.0) 5,880	(8.4) 5,974	(9.3) 5,695	(7.9) 5,311
	Others	New Zealand	(4.4) 4,374	(3.4) 2,878	(3.9) 2,720	(2.3) 1,638	(2.1) 1,545	(2.0) 1,484	(2.0) 1,393	(1.8) 1,086	(1.9) 1,291
		Chile	(3.8) 3,795	(4.6) 3,952	(6.7) 4,726	(5.6) 3,987	(5.7) 4,236	(5.5) 4,055	(4.9) 3,479	(4.9) 2,994	(3.7) 2,457
		Australia	(8.7) 8,604	(10.2) 8,729	(11.0) 7,722	(6.6) 4,662	(6.4) 4,684	(6.3) 4,604	(6.0) 4,271	(4.3) 2,628	(5.1) 3,432
		China	(2.5) 2,445	(3.0) 2,544	(3.0) 2,084	(2.8) 1,967	(2.7) 1,982	(2.6) 1,901	(2.5) 1,777	(2.6) 1,591	(3.2) 2,144
		Viet Nam	/	/	/	(7.6) 5,418	(6.7) 4,917	(8.1) 5,939	(9.0) 6,446	(9.5) 5,840	(11.0) 7,364
		Other	(7.7) 7,651	(12.3) 10,591	(10.9) 7,663	(8.0) 5,696	(8.3) 6,116	(8.1) 5,911	(8.2) 5,823	(6.9) 4,245	(6.7) 4,476
Subtotal		(81.8) 81,241	(80.0) 68,681	(74.0) 52,018	(69.2) 49,086	(68.4) 50,430	(67.6) 49,505	(66.6) 47,464	(64.2) 39,412	(64.1) 43,015	
Domestic wood		(18.2) 18,022	(20.0) 17,176	(26.0) 18,236	(30.8) 21,797	(31.6) 23,312	(32.4) 23,680	(33.4) 23,805	(35.8) 21,980	(35.9) 24,127	
Total		99,263	85,857	70,253	70,883	73,742	73,184	71,269	61,392	67,142	

Sources Ministry of Finance "Trade Statistics of Japan", Forestry Agency "Wood Supply and Demand Chart"

Notes 1. Figures refer to the sum of domestic/imported roundwood volume and imported products volume (sawnwood, plywood, and pulp and chips) converted into roundwood equivalent.

2. "Others" of "Southeast Asia" includes Philippines, Singapore, Brunei, Papua New Guinea, and Solomon.

3. "Others" of "Others" includes African countries.

4. "Others" of "Others" includes Viet Nam until 2014.

5. Figures in parentheses refer to the percentage of each volume to the "total" volume of each year.

6. Due to rounding, some totals may not correspond with the sum of the separate figures.

### 14. Number of Mills/Factories and Production Volume

		Unit	2000	2005	2010	2015	2017	2018	2019	2020	2021
Sawnwood	Number of mills	mill	11,692	9,011	6,569	5,206	4,814	4,582	4,382	4,115	3,948
	Arrival of logs	1,000 m <sup>3</sup>	26,526	20,540	15,762	16,182	16,802	16,672	16,637	14,851	16,650
	Shipment	1,000 m <sup>3</sup>	17,231	12,825	9,415	9,231	9,457	9,202	9,032	8,203	9,091
Plywood	Number of mills	mill	354	271	192	185	181	180	176	173	158
	Arrival of logs	1,000 m <sup>3</sup>	5,401	4,636	3,811	4,218	5,004	5,287	5,448	4,626	5,093
	Surface-untreated plywood production	1,000 m <sup>3</sup>	3,218	3,212	2,645	2,756	3,287	3,298	3,337	2,999	3,172
	Surface-treated plywood production	1,000 m <sup>3</sup>	1,534	1,037	647	524	623	580	562	488	620
Glued laminated timber	Number of factories	factory	281	259	182	157	165	165	162	148	132
	Production	1,000 m <sup>3</sup>	892	1,512	1,455	1,485	1,971	1,923	1,920	1,740	1,982
Cross laminated timber	Number of factories	factory	...	...	...	...	7	9	9	11	11
	Production	1,000 m <sup>3</sup>	...	...	...	...	14	14	13	13	15
Wood chips	Number of mills	mill	2,657	2,040	1,577	1,424	1,364	1,303	1,250	1,196	1,082
	Production	1,000 tons (1,000 m <sup>3</sup> )	...	6,005	5,407	5,745	5,954	5,706	5,266	4,753	6,070

Sources MAFF "Wood Supply and Demand Report", Japan Laminated Wood Products Association

Notes 1. "Sawnwood" excludes sawmills with output power less than 7.5kW.

2. Figures of LVL are added to figures of "Plywood" since 2017.

3. Figures of glued laminated timber are based on the data from Japan Laminated Wood Products Association until 2016.

4. "Wood chips" excludes chips for fuel.

5. The symbol "..." means "unknown or lack of investigation".

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