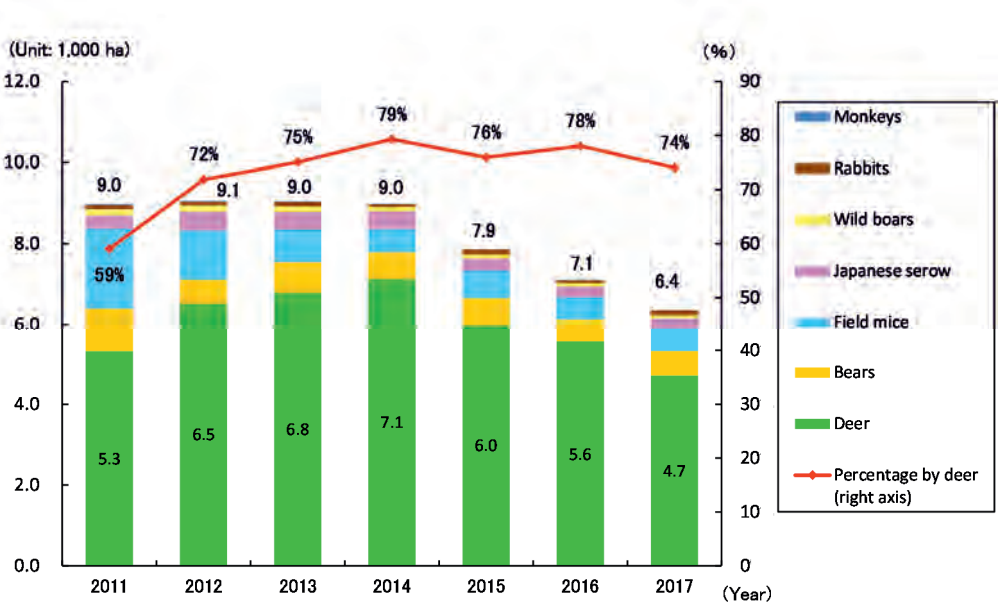
### (4) Forest Damage by Wildlife, Pests and Forest Fire

In recent years, the area of forests damaged by wildlife has been declining, but it still remains in a serious situation. In FY2017, about 6,400 ha of forests were damaged by wildlife, about ¾ of which was caused by deer (Fig. II – 6). To prevent the damage, the GOJ promotes comprehensive measures including subsidies for barrier fences and population control through capturing wildlife.

Damage by pinewood nematode (*Bursaphelenchus xylophilus*) is also declining; it remains the worst forest pest in Japan. In FY2017, pinewood nematode damaged about 0.4 million $m^3$ of wood. To prevent the spread of this pest, the Forestry Agency propagates pest-resistant seedlings, implements prevention measure with chemicals, and eradicates the nematode and mediating insects by logging and fumigation of affected trees.

In 2017, 1,284 forest fires occurred, burning down 938 ha of forest. The number of forest fires are declining in the long term. Forest fires intensively occur in winter and spring, most of all caused by people carelessly using fire.



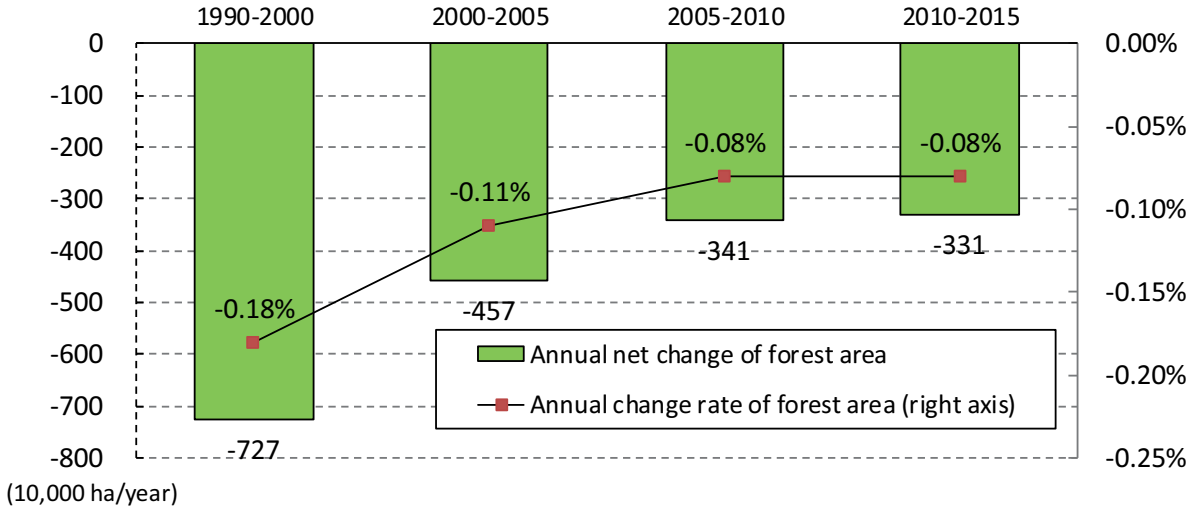

Source: Survey by Forestry Agency

Fig. II – 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 world forest area was approximately 4 billion hectares in 2015 (about 31% of global land area). The global forest area is still decreasing, but the speed has slowed down (Fig. II – 7).




Source : Global Forest Resources Assessment 2015 (FAO), R.J. Keenan et al., (2015) Dynamics of global forest area: Results from the FAO Global Forest Resources Assessment 2015. Forest Ecology and Management, 352: 9-20.

Fig. II – 7 Changes in global forest area

Since illegal logging is one of the factors obstructing global environment conservation and sustainable forest management, the international community is making efforts to combat illegal logging through various international frameworks. 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.

In Japan, two forest certification schemes have been widely in place, one of which is run by the Forest Stewardship Council (FSC), an international organization, and other is run by the Sustainable Green Ecosystem Council endorsed by Programme for the Endorsement of Forest Certification schemes (SGEC/PEFC-J), which was established as the domestic certification scheme in Japan, and is endorsed by the Programme for the Endorsement of Forest Certification (PEFC) in 2016. About 10% of forests in Japan are certified by FSC (about 0.41 million ha) and/or SGEC (about 1.89 million ha). The procurement of certificated wood in preparation for the Tokyo 2020 Olympics/Paralympics is also expected to encourage forest certification.

### (2) Global Warming and Forests

The “Paris Agreement” was adopted at the twenty-first session of the Conference of the Parties (COP21) of the United Nations Framework Convention on Climate Change

(UNFCCC) held in 2015 as an effective legal framework applicable to all parties, and it came into force during COP22 in November 2016. COP24, held in Poland in December 2018, adopted the Paris Agreement Work Programme (PAWP) for full implementation of the Agreement. PAWP allows parties to set a target and tracking the progress by using existing methods and guidance. It is expected that the carbon sink strategy will continue to have important role in achieving the global goal of reducing greenhouse gas (GHG) emission.

In order to achieve GHG reduction targets stipulated in the “Plan for Global Warming Countermeasures” (May 2016), Japan needs to steadily implement forest sink measures including managing forests through thinning and use of wood.

The GOJ has taken initiatives in “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 has promoted adaptation measures based on the “Climate Change Adaptation Plan” (formulated in November 2018).

### (3) International Discussions on Biodiversity

As of October 2018, the “Convention on Biological Diversity (CBD)” has been signed by 194 countries, the European Union (EU) and the State of Palestine. Japan becomes the 98th party of the “Nagoya Protocol on Access to Generic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity.”

### (4) International Cooperation

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

Approximately $640 million was provided into official development assistance (ODA) for the forestry sector worldwide in 2016, of which $36 million was from Japan. Japan was the fourth largest donor following France, Germany, and the United Kingdom.

Japan’s technical cooperation is conducted as technical cooperation projects, which optimally combine the “dispatch of experts,” “acceptance of training participants” and/or provision of equipment, training, etc. through the Japan International Cooperation Agency (JICA). At the end of December 2018, in the forestry sector, Japan was conducting 19 technical cooperation projects through JICA. The Forestry Agency dispatched 9 experts to 7 countries through JICA. Also, the GOJ provides financial support such as grants and loans through JICA; grants for support of afforestation and reforestation projects and for procurement of the machinery and materials for forest management; and loans for promoting afforestation and reforestation projects and developing human resources.

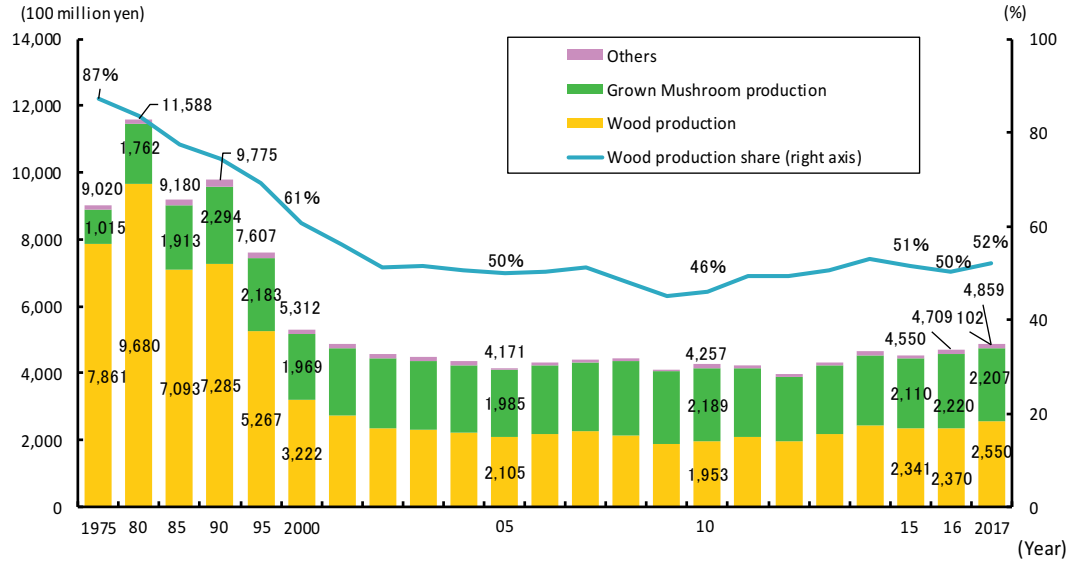
The GOJ also provides financial support to cover the International Tropical Timber Organization (ITTO) and FAO.

## 1. Forestry

### (1) Forestry Production

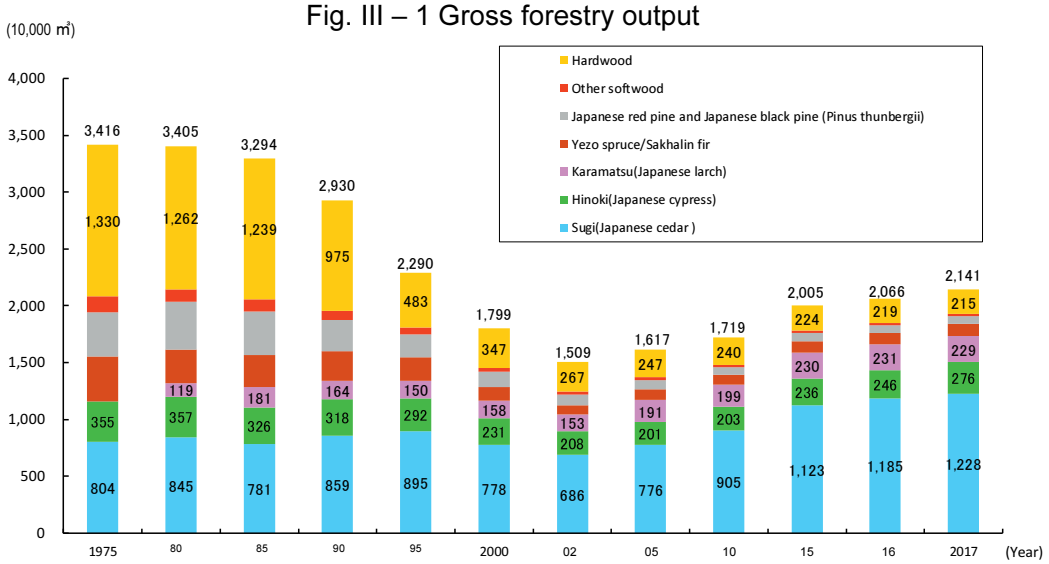
Total forestry output in 2017 was 485.9 billion yen, which was an increase of 3% over the previous year, and the highest since 2002. Percentage of wood production in forestry has stood around 50% since 2002 (Fig. III – 1).

The volume of domestic roundwood has tended to increase in recent years, reaching 21.41 million $m^3$ in 2017. By tree species, the volume of Sugi (Japanese cedar) production was 57%, Hinoki (Japanese cypress) 13%, Japanese black pine 11%, and hardwood 10% (Fig. III – 2).




Source: MAFF: Forestry output

Fig. III – 1 Gross forestry output




Source: MAFF: Report on supply and demand of lumber

Fig. III – 2 Volume of domestic roundwood

### (2) Forestry Management

The 2015 Census of Agriculture and Forestry shows that the number of forestry households was 830,000, 88% of which owned less than 10 ha of forest area. Small-scaled forest ownership remains dominant.

The census shows that a total of 19.89 million $m^3$ (increase of 27% over previous 5 years) of logs was produced by forestry entities. In addition, the quantity produced per forestry management entity has grown rapidly to 4,188 $m^3$ (30% increase over previous 5 years). On the other hand, 46% of all forestry management entities produce less than 1,000 $m^3$/year of logs, revealing that many are small-scale entities.

### (3) Improvement of Forest Productivity

**Concentration of operation**

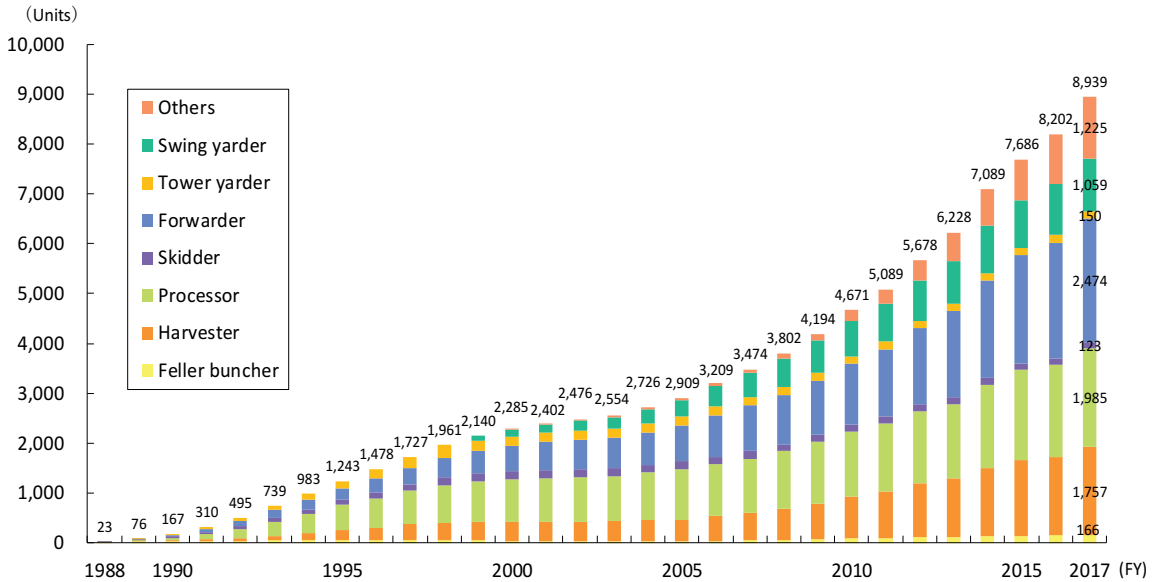
The Forestry Agency and prefectures are concentrating operation by training “Forest Management Planners” who will conduct proposal-based coordination with forest owners and consolidation of forestry practices.

Municipalities are preparing a forest area register that will centralize information about ownership and boundaries of forest area.

**Low cost and efficient log production systems**

The number of high-performance forestry machines are increasing to make timber production systems more efficient. In 2017, 74% of all logs were harvested by work systems utilizing high-performance forestry machines (Fig. III – 3).

In addition, forestry machines using robotic technologies are being developed, which contribute to safety and laborsaving in forestry work.

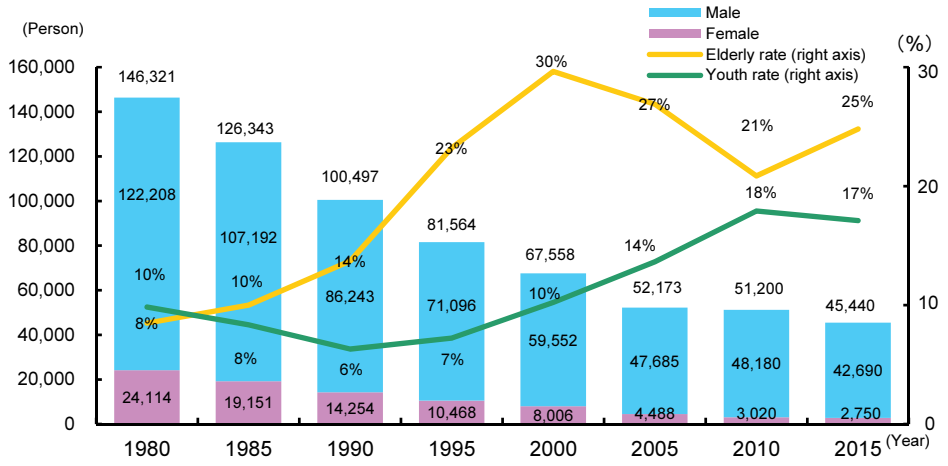



Source: Forestry Agency: Forests and Forestry Statistical Manual.

Fig. III – 3 Number of advanced forestry machines

### (4) Forestry Workforce

According to the 2015 national census, the number of forestry workers was 45,440, tending to decline in the long-term. The share of aged forestry workers (aged 65 or older) was 25%, while the share of young forestry workers (aged 35 or younger) was 17% in 2015 (Fig. III – 4). The workplace accident rate in the forestry industry, which represents the rate of deaths and injuries per 1,000 workers, was 32.9 in 2017. The rate continues to be the highest rate among all industries. Measures to achieve safer working environments are being promoted.




Source: Ministry of Internal Affairs and Communications, National Census

Notes: Elderly percentage of workers 65 years of age or older, and youth rate is percentage of workers 35 of age or younger.

Fig. III – 4 Number of forestry workers

## 2. Non-wood Forest Products

Non-wood forest products include mushrooms, edible nuts, wild vegetables, Japanese lacquer, bamboo, charcoal, etc. Non-wood forest products account for about half of the forestry output and play key roles in stimulating rural economies and ensuring employment. The value of non-wood forest products in 2017 was 278.3 billion yen, a decrease of 1% over the previous year.

### (1) Mushrooms

Mushrooms earned more than 80% of the value of non-wood forest products in 2017. Production of mushrooms has been flat in recent years, reaching 459,000 tons in 2017.

### (2) Other Non-wood Forest Products

Total production of charcoal has been decreasing over the long term, reaching 23,000 tons in 2017. Bamboo material (raw material for bamboo paper) has been increasing since 2011, reaching 36,000 tons in 2017. Production of Japanese lacquer has also increased in recent years. Total fuelwood production was 52,000 $m^3$ in 2017, and it has

remained at approximately 50,000 $m^3$ in recent years (converted to logs).

In August 2018, “Iwate Charcoal” was registered as charcoal for the first time in the Geographical Indication (GI) protection system that protects the names of regional brand products as intellectual property. To improve and stabilize the quality of charcoal, it is standardized to use hardwood in the prefecture as raw materials and to use original kilns for this charcoal.

GI registered charcoal products

Making the charcoal

## 3. Hilly and Mountainous Rural Communities

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

Hilly and mountainous rural communities, where people engage in forestry, 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 the total land area, accounting for approximately 60% of the total forest area. It is becoming more difficult to maintain the management of forests due to continuing depopulation and the aging population in such communities.

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

In order to maintain forests around mountain villages, it is vital that regional residents engage with the mountain village forests continuously while utilizing forest resources. The Forestry Agency supports regional residents in maintaining mountain village forests and using forest resources.

The Forestry Agency is promoting effective exchanges between hilly and mountainous rural communities and urban societies including through hands-on activities, forest environmental education, and “Countryside Stay" (Rural Tourism), which helps tourists experience traditional Japanese life.

Also, the Forest Agency is promoting “Forest-related Service Industry” by linking forests and forestry with diverse fields such as medical care, welfare, tourism, and education to use forest space in ways matched to changes in the people’s values and their lifestyles.

Mt. Ryusan in Rankoshi town in Hokkaido, which is acidic sulfate soil caused by the large-scale collection of soil in the 1980s, has been a treeless mountain where no vegetation has grown for more than 20 years. Since 2004, an owner of the mountain forest has independently restored vegetation on the land. In 2015, an organization of regional residents was formed, and it has revived natural growth on the treeless areas and managed surrounding forests. Many people including an illustrator, students, and so on, who come from outside the village, join and support these activities. As a result of these activities, the natural vegetation of Mt. Ryusan has been restored, young forests have been established, and the appearance of the treeless mountain has been improved.

View of conservation activities on Mt. Ryusan.

## Chapter IV　Wood Product Demand and Use of Wood

### 1. Supply and Demand for Wood

#### (1) Global Wood Supply and Demand

The total volume of industrial roundwood consumption at a global level had decreased a result of a rapid economic slump in the autumn of 2008, but in 2010 it started to increase again, according to the FAO.

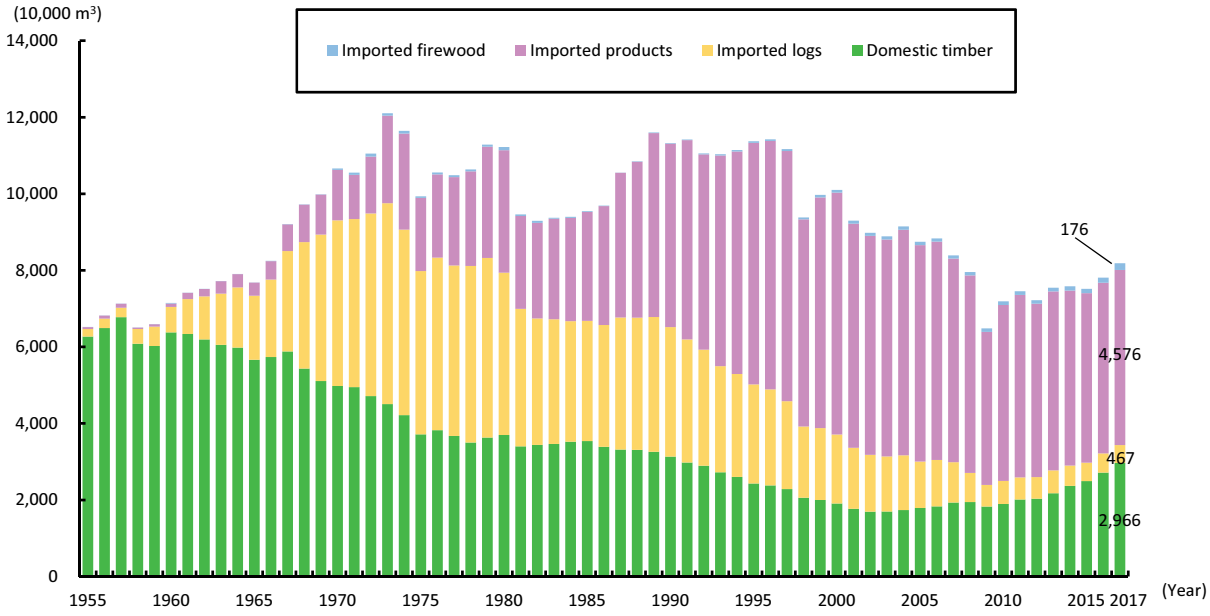
In 2017, production and consumption of sawn softwood increased in Europe, Russia, and North America. The major export destination of lumber from Europe and Russia was China. In North America, under the impact of lively demand and severe forest fires, the price of sawn softwood increased, which has affected the international market.

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

Japan's wood demand bottomed out in 2009 and has recovered, so that total wood product demand in Japan in 2017 was 81.85 million $m^3$ (roundwood equivalent), which was a 4.8% increase over the previous year, and had exceeded 80 million $m^3$ for the first time in 10 years (Fig. IV – 1).

Domestic wood supply bottomed out in 2002 and has recovered, reaching 29.66 million $m^3$ in 2017, which was an increase of 9.3% over the previous year (Fig. IV – 1). In particular, the quantity of fuelwood supplied has continued to rise sharply, reaching 6.04 million $m^3$, a 35% increase over the previous year.

The volume of imported wood in 2017 was, under the impact of rising wood product demand, 52.19 million $m^3$, an increase of 2.5% over the previous year (Fig. IV – 1).




Source: Forestry Agency, Wood Demand and Supply Chart

Fig. IV - 1 Changes of wood supply

### (3) Wood Prices

The prices of domestic roundwood rose a little in 2018, while prices of sawn lumber were flat. Domestic wood chip prices rose.

### (4) Illegal Logging Countermeasures

“The Clean Wood Act” came into force in May 2017. The Act stipulates that all businesses 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 appropriately and reliably take steps to confirm the legality of wood and wood products may apply to a registration body (there are six such bodies in operation) to obtain registration as a “registered Wood-related Business Entities.” As of March 2019, 212 companies had completed this registration process.

### (5) Wood Exports

The value of wood exports has been rising since 2013, and in 2018, it reached 35.1 billion yen, a 7% increase over the previous year. Various organizations have been promoting wood products from domestic wood for export.

The Japan Wood Products Export Association has opened the Japan Pavilion at the Salon Raisonance, a crafts market in Strasbourg, France. At the venue, luxury wooden products are publicized by displaying wooden panels processed using “Kumiko” woodwork technique, wooden handbags, etc. which express harmony obtained by blending Japan’s traditional processing technologies and modern design.

View of the Japan Pavilion at an exhibition in France

## 2. Wood Products Industry

### (1) State of the Wood Product Industry

The value of shipments of lumber and the wood products industry bottomed out in 2009 and has recovered. The value in 2016 reached 2.7 trillion yen, almost equal to the value of the previous year.

### (2) Sawmilling industry

Shipments of sawn products fell until 2009 and remained flat the beginning of 2010. In 2017, shipments rose to 9.46 million $m^3$, which was an increase of 1.8% over the previous year. The quantity of industrial wood received by sawmills was 16.8 million $m^3$ in 2017.

### (3) Glued Laminated Timber Manufacturing Industry

In 2017, 1.69 million $m^3$ of glued laminated timber (glulam) was produced in Japan. The timber for glulam used was 26% domestic wood, 67% European wood, and 6% American wood. Imports of glulam on the other hand, were 980,000 $m^3$. In total, 2.67 million $m^3$ of glulam was supplied.

### (4) Plywood Industry

Production of plywood in 2017 was 3.29 million $m^3$, which was an increase of 7% over the previous year. By use, 2.94 million $m^3$ was structure use, while 30,000 $m^3$ was used as concrete formwork, revealing that most is structural use.

The total wood demand for plywood, including imported products, was 10.67 million $m^3$.

### (5) Wood Chip Manufacturing Industry

Production of wood chips (excluding fuel use chips) in 2017 was 5.95 million tons, which was an increase of 2% over the previous year. Almost all the materials for domestic wood chip mills are domestic wood, and the share of conifer wood in domestic wood rises year by year, reaching 57% in 2017. However, the share of domestic wood chips in total wood chip consumption was remaining around one-third in 2017.

### (6) Precut Processing Industry

The rate of use of precut lumber for post and beam construction method reached 92% in 2017.

### (7) Cross Laminated Timber (CLT) and Other New Products and Technologies

New products and technologies have been developed and popularized to create wood demand in areas where wood has not been used very much in the past.

Even in Japan, apartment houses, hotels, office buildings, school buildings and other mid-to-high-rise buildings have been constructed by Cross Laminated Timber (CLT), wooden fire-resistant members and other wooden materials.

In terms of the use of woody biomass in materials, high value-added products have been developed from new materials, e.g. Cellulose Nanofibers (CNF), and glycol lignin.

In October 2018, a prototype car was announced which was equipped with interior and exterior components using the new material, glycol lignin extracted from Sugi (Japanese cedar). The Forestry and Forest Products Research Institute has been studying glycol lignin production technology, and successfully established a production method that can stably extract lignin from Sugi. In the future, high value-added products, e.g. auto parts, will come into wide use, and the creation of this new industry, glycol lignin manufacturing, will be counted on to stimulate hilly and mountainous regions.

Glycol lignin

Prototype car equipped with interior and exterior components using the new material, glycol lignin

Photos: Forestry and Forest Products Research Institute, National Institute of Advanced Industrial Science and Technology, Miyagi Kasei Co., Ltd., Mitsuoka Motor Co., Ltd.

## 3. Wood Use

### (1) Importance of Wood Use

Wood use could contribute to sustainable fulfillment of multiple functions of forests including prevention of global warming, as well as vitalization of local economies. Wood use is also considered to provide comfortable and healthy living conditions, through showing excellent properties of humidity conditioning, heat insulation, and shock absorption, as well as the relaxing and stress-reducing effect of its scent.

### (2) Wood Use in Housing and Construction

In Japan, about half of new housing starts are wooden construction, greatly impacting wood demand. A revision to the Building Standard Law was proclaimed in June 2018, which incorporates revisions to the scale of wooden buildings that require fire-resistant construction in order to meet the diverse needs related to wooden construction.

Sumita-town fire department building
（Iwate Prefecture）

Inside TORAYA Akasaka Store
（Tokyo）

Examples of wood use in varied facilities in Japan

### (3) Wooden Public Buildings

The wooden construction rate (based on floor area) was 13.4%, which is an increase of 1.7 points over the previous year, of all public buildings whose construction started in FY2017. And among low-rise buildings, it was 27.2%, which is an increase of 0.8 points over the previous year.

More than 60% of low-rise public buildings were constructed by private builders, and about 80% were medical care or welfare facilities.

### (4) Energy Use of Woody Biomass

The quantity of woody biomass for energy use has been increasing recently; wood chips, wood pellets, firewood and sawdust are used by 8.73 million ton, 380 thousand ton, 60 thousand ton, and 410 thousand ton, respectively in 2017.

While the increased use of woody biomass is mainly caused by a boom in woody biomass power plants, the Forestry Agency is also encouraging heat-use, which has higher energy conversion efficiency.

### (5) Spread of the Use of Wood among Consumers

The Forestry Agency has been promoting the “Kizukai Undo,” an initiative to disseminate the importance of wood use among consumers, including the “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,” educational activities to disseminate the excellence and significance of wood use among both adults and children.

Mokuiku (wood use education) Exchange Base created through citizen participation: Nagato Toy Museum (In Yamaguchi Prefecture)

## Chapter V National Forest Management

### 1. Roles of National Forests

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

National forests occupy 7.58 million ha of land, almost 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, watershed conservation, etc.

National forests which have diverse ecosystems, are important for the conservation of biodiversity, and 95% of the land designated as “World Natural Heritage” sites in Japan (Shiretoko, Shirakami Mountains, Ogasawara Islands, Yakushima Island) is located in national 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.

Since FY2013, this program has been executed under the General Account Budget with a view to further promoting the sound management of national forests aiming to enhance public benefits and to contribute to revitalization of Japan’s forests and forestry.

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

#### (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 “landslide prevention,” “natural conservation,” “recreational use,” “comfortable environment development,” and “watershed conservation.”

Ninety-percent of national forests are conservation forests such as watershed conservation. The Forestry Agency improves devastated land and conservation forests through forest conservation projects in order to ensure the people safe and worry-free lives.

The Forestry Agency designates and manages “Protected Forests” and “Green Corridors” in order to conserve biodiversity. In April 2018, Protected Forests were designated at 666 locations covering 977,000 ha of land, which accounted for 13% of national forest area. “Green Corridors” were formed in April 2018 at 24 locations, covering 584,000 ha of land, and accounting for 8% of national forest area. The Forestry Agency takes measures to protect rare species of wildlife, and prevents deer and other wildlife from damaging forests.