State of Japan's Forests and Forest Management

— 4th Country Report of Japan to the Montréal Process —

March 2025

Forestry Agency, Japan

This report was prepared by the Forestry Agency, Japan to provide information on the state of its forests and forest management in accordance with the Criteria and Indicators of the Montréal Process.

Foreword

Forests benefit people's lives and the stability of national economies through the sustainable fulfillment of their multiple functions, such as land conservation, water resources conservation, global warming prevention, biodiversity conservation, and forest products supply. The “non-legally binding authoritative statement pf principles for a global consensus on the management, conservation and sustainable development of on all types of forests,” adopted at the United Nations Conference on Environment and Development (the Earth Summit) in 1992, recognizes that sustainable forest management, as “Forest resources and forest lands should be sustainably managed to meet the social, economic, ecological, cultural and spiritual needs of present and future generations.” and calls for the commitment of each country and the international community to this goal. Since the Earth Summit, the promotion of sustainable forest management has become an important international issue. Various regions of the world have made efforts to develop criteria and indicators for objectively assessing its sustainability.

In response to this, the Montréal Process was initiated in 1994 with the participation of 12 countries with temperate and boreal forests, including Japan. In 1995, criteria and indicators were developed as a “measure” to objectively identify, analyze, and evaluate the progress of sustainable forest management in temperate and boreal forests. Since then, Japan has been working with other countries, participating in the Montréal Process, reviewing and revising the criteria and indicators, and preparing country reports and other documents applying these indicators over the past 30 years.

The Forestry Agency, with the cooperation of the Forestry and Forest Products Research Institute and other relevant ministries and agencies, has been preparing the fourth country report and is now ready to publish it. We would like to express our deepest gratitude for the cooperation of all concerned organizations. This fourth national report summarizes trends in Japan's sustainable forest management since our third national report in 2019, following the indicators of the Montréal Process, paying attention to continuity and adding new data where possible.

We hope this report will provide helpful information on the current status of sustainable forest management in Japan to the countries participating in the Montréal Process and other countries and will also assist the efforts of countries and international organizations to promote sustainable forest management.

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March 2025

Acknowledgements

This report results from the efforts of many people and organizations, whose contributions are briefly described and acknowledged below.

The main persons in charge of this report were Mr. KAWASHIMA Yutaka, Senior Policy Analyst for International Affairs, a member of the Planning Division, Forestry Agency, and Ms. MIYATA Sawako, a member of the International Forestry Cooperation Office, Forestry Agency, who performed a series of tasks including collecting, processing and charting data and materials, preparing drafts of the report, cooperating and coordinating with related agencies, and editing the report.

In addition to providing the necessary data and materials, the staff of each section and office of the Forestry Agency contributed to making the report more accurate and easier to understand by revising and advising on the draft report.

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We are deeply grateful for all these efforts.

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The current state of the forests

Japan is an archipelago that extends approximately over 3,000 km from east to west and north to south, where boreal, cool temperate, warm temperate, and subtropical forests are distributed along the climatic zones. These forests are affected by human activities and natural conditions, such as distinct monsoons in summer and winter, as well as intricate geographical and geological features.

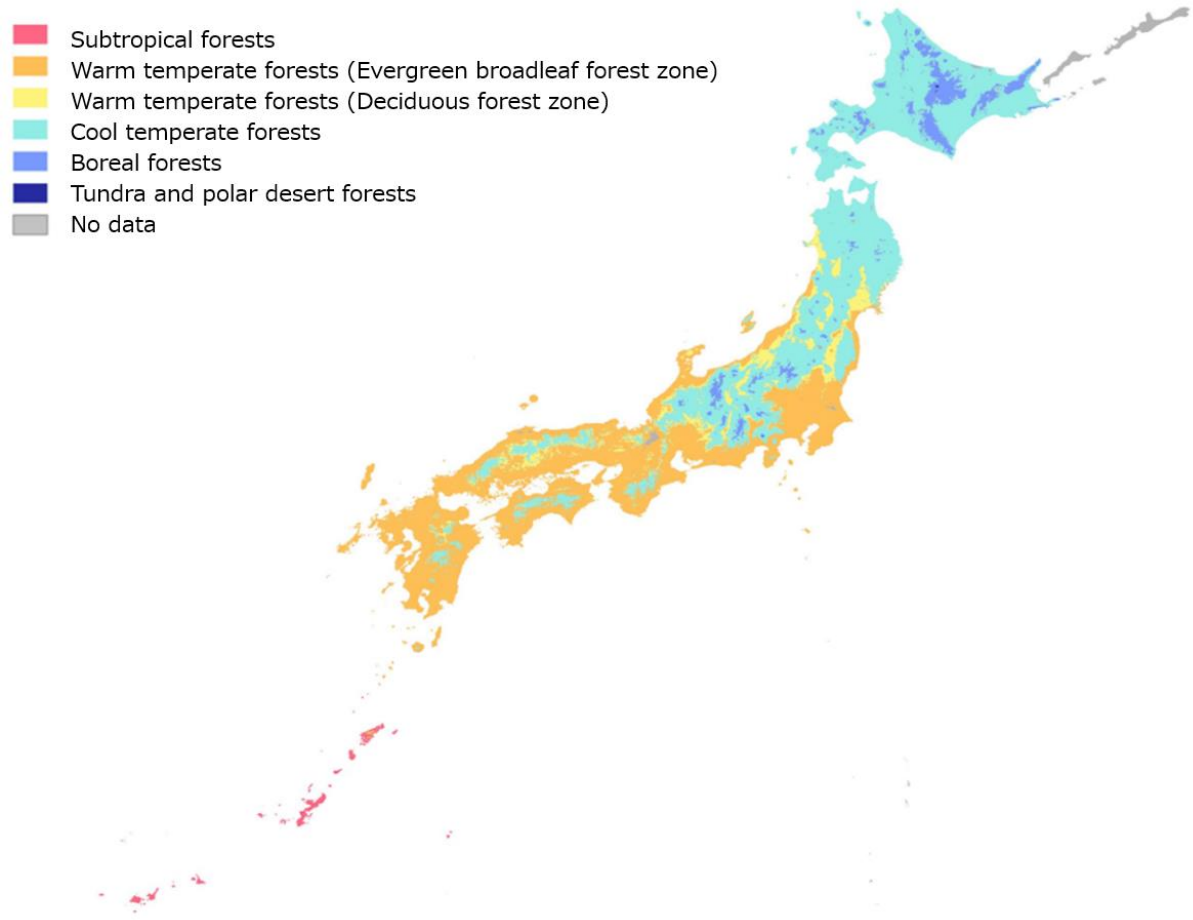


Figure i: Vegetation zone in Japan

Source: Created by Forestry Agency based on Kira's Warmth Index; MLIT, National Land Data (Mean Annual Mesh Data).

The total area of Japan's forests is approximately 25 million ha, which corresponds to about two-thirds of the total land area. The coverage of forests has been maintained for more than 70 years. While there is a long history of protecting forests by establishing systems such as logging prohibited forests from the 17th century, over-harvesting, deforestation, and natural disasters occurred frequently during the rapid economic growth period after the Meiji Restoration and during and after World War II. Today's forests have been established and maintained thanks to Japan's warm and humid climate and the tireless efforts by its people to restore the forests.

Currently, approximately 70% of the 185 species of terrestrial mammals and approximately 40% of the 8,118 species of vascular plants in our country live in forests.

As for the forest ecosystem types, forests dominated by coniferous tree species and forests dominated by broad-leaved tree species account for 51% and 46%, respectively, and there are various other types of forest

ecosystems in Japan (Note: The dominant tree species are defined as those that account for 30% or more of the total basal area). The National Forest Inventory survey found that there has been no major change in the area of each forest ecosystem type over the past 20 years. However, careful monitoring of beech (*Fagus crenata*) trees is required since the survey found regional variation, with some areas having many plots where young trees have been continuously observed over the past 20 years, and others without any young trees observed during the same period.

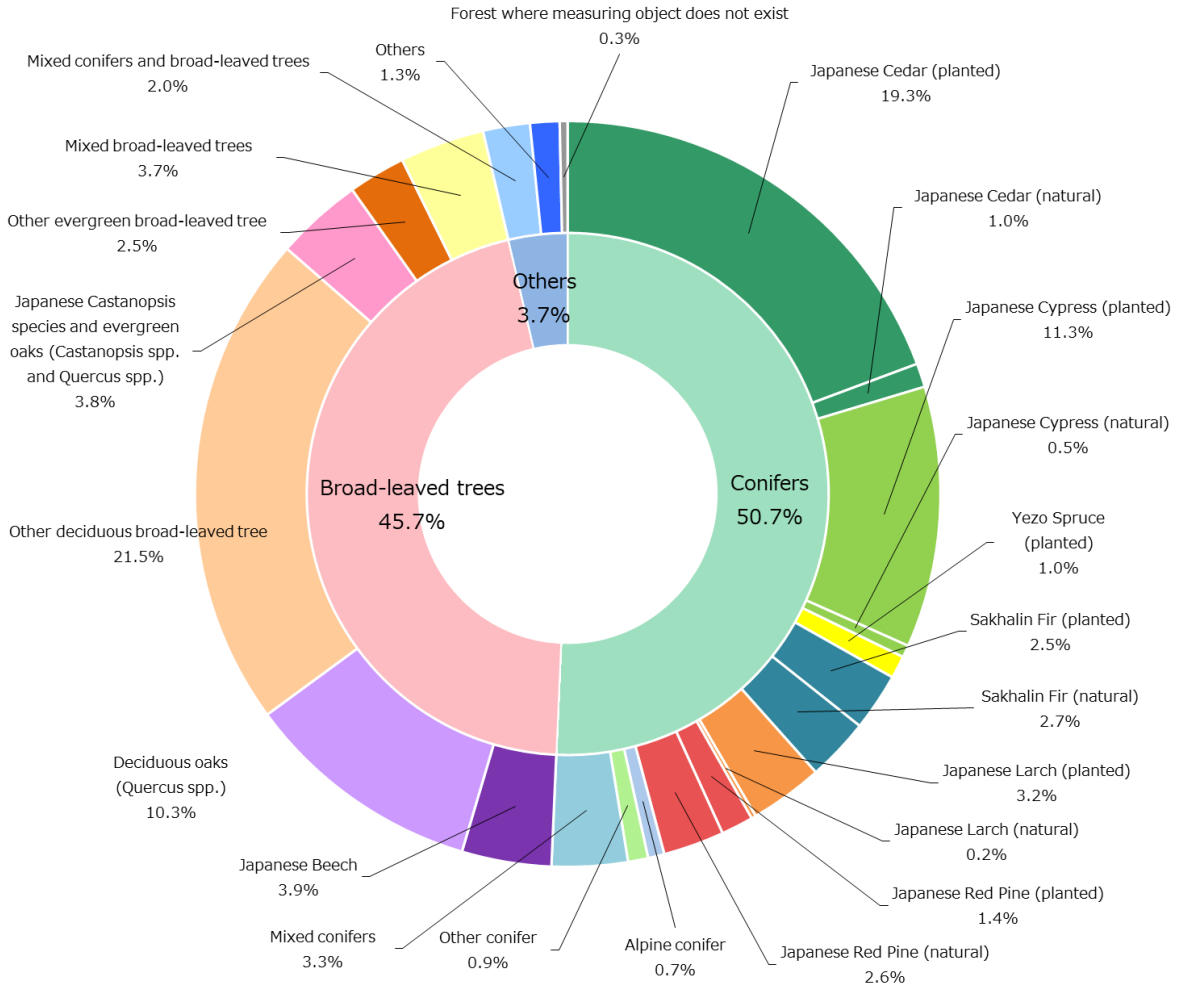


Figure ii: Composition of forest ecosystem types by dominant tree species

Note: Aggregated based on the dominant tree species, which are tree species occupying more than 30% of the total basal area of tree species that appear in the spot.

Source: Forest Agency, the 4th National Forest Inventory survey.

In 2022, approximately 54% of forests in Japan are classified as natural forests, according to the statistics of Forestry Agency. Some natural forests distributed in remote areas have preprimary forest ecosystems and fauna and flora. Other natural forests have been normally affected by human interventions, such as fuelwood production, commercial logging and enrichment plantation.

The forest growing stock has been increasing steadily, particularly in the planted forests. Japan's total growing stock is approximately 5.6 billion m^3, which accounts for about threefold the stock in the 1960s.

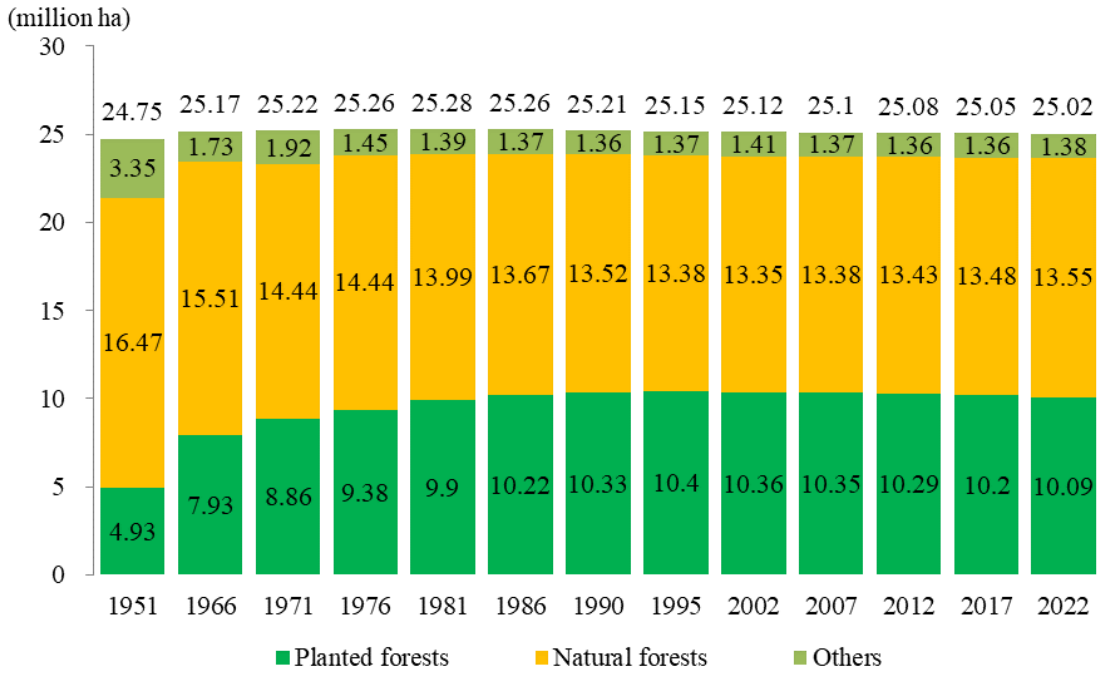


Figure iii: Changes in forest area of Japan

Note: Discrepancies in totals are rounded.

Source: MAFF, Statistics Charts (1951 only); Forestry Agency, State of Forest Resources (from 1966 onwards).

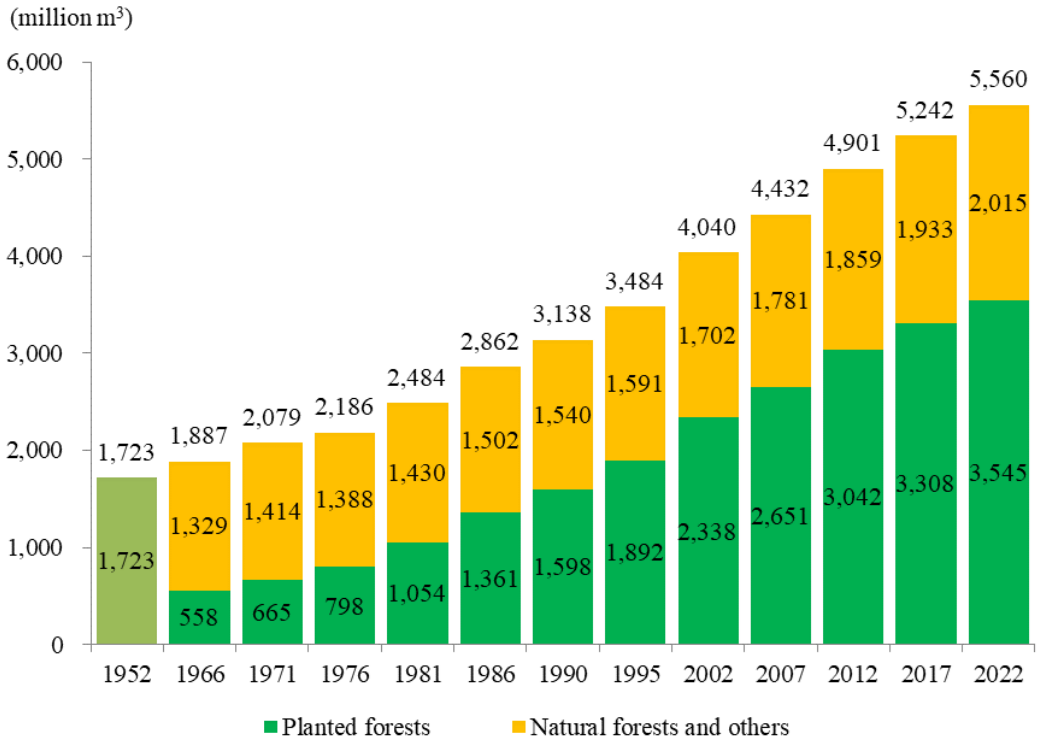


Figure iv: Changes in the total growing stock of forests in Japan

Note: The data for 1952 is as of March 1, 1952; for 1966, it is as of the end of FY1966; for 1971, it is as of April 1, 1971; and for 1976 and later, it is as of March 31 each year.

Source: MAFF, Statistics Charts (1952 only); Forestry Agency, State of Forest Resources.

The majority of the planted forests of Japan were established during the late 1950s through the early 1970s while wood demands for construction and pulp was increasing under the rapidly growing economy. Although there are still many forests that require thinning, more than 60% of the planted forests have reached higher than 50 years, which is a general harvesting age in Japan.

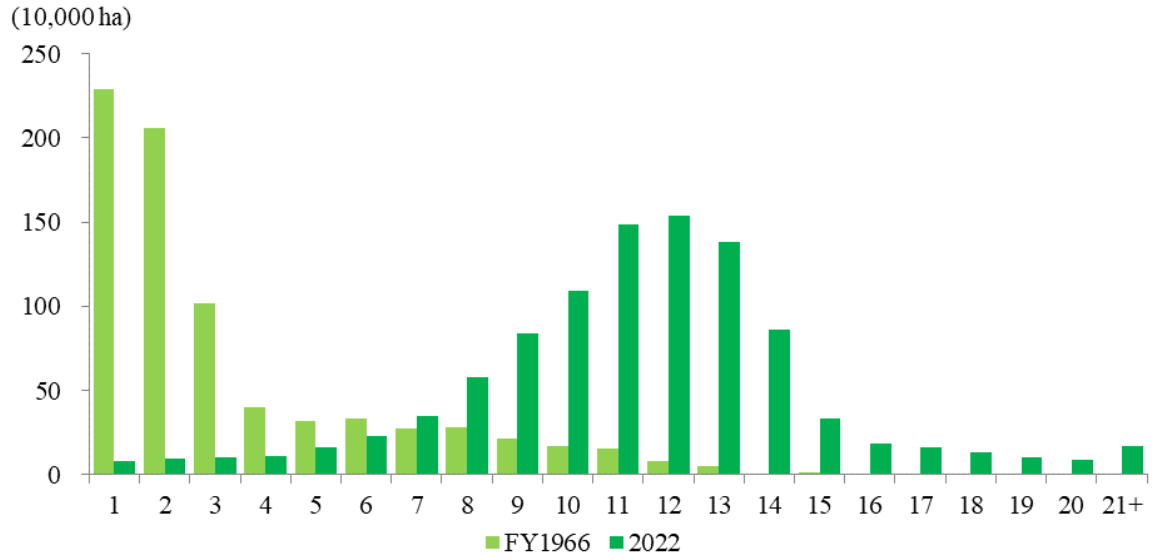


Figure v: Changes in composition of age class of planted forests
Source: Forestry Agency, Forest Resources in Japan (FY1966); Forestry Agency, State of Forest Resources (2022).

Although Japan's forests have positive aspects, such as an increase in growing stocks, Japan encounters many issues regarding forest protection, such as sika deer (*Cervus nippon*) damage to planted forests, damage from Pine wilt disease, Japanese oak wilt, etc.

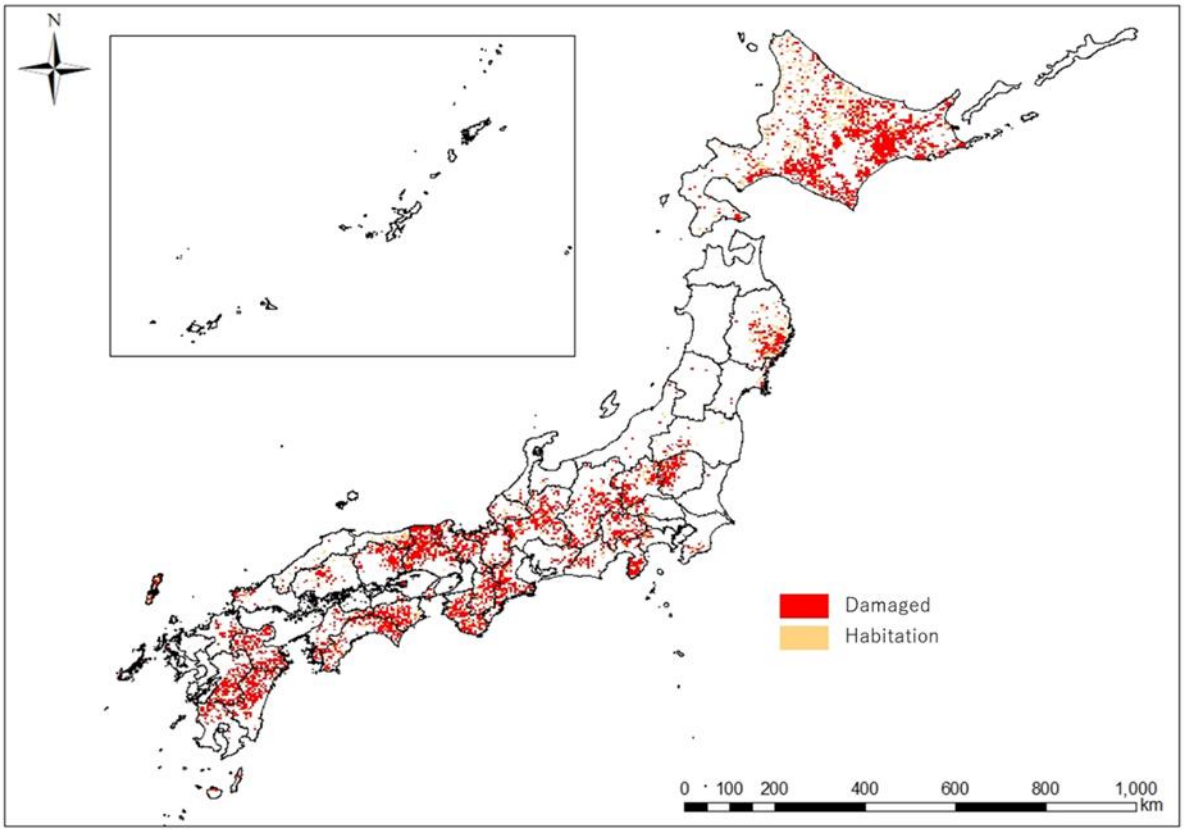


Figure vi: Distribution of plots that contain information on damages caused by sika deer or habitation of sika deer
Source: Forestry Agency, the 4th National Forest Inventory survey.

Healthy and vital forests provide us with socio-economic and environmental benefits. In recent years, with the increase of global environmental issues, people's expectancy of forests for global warming prevention, disaster prevention, and water resource conservation by forests have consistently ranked high.

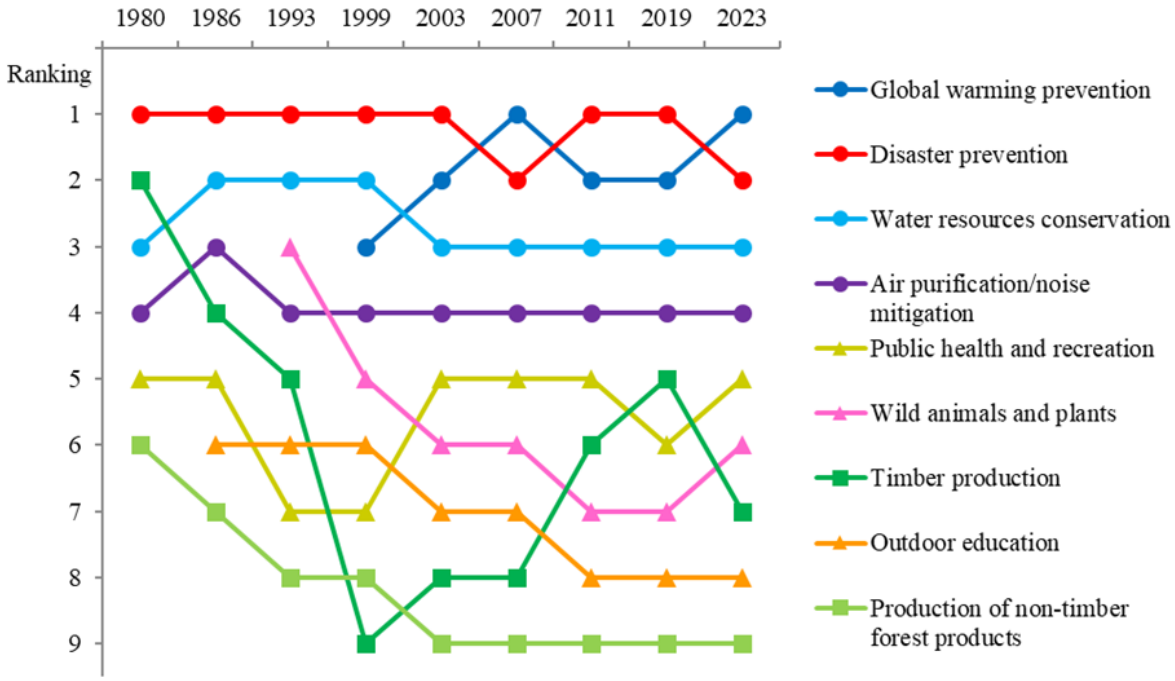


Figure vii: Changes in public expectations on forests
Note 1: Multiple answers to select three of the alternatives.
Note 2: The responses "Nothing in particular," "Do not know," and "Other" are not included in the chart.
Source: Prepared by Forestry Agency based on Prime Minister's Office, Poll on Forest and Forestry (1980); Poll on Greenery and Trees (1986); Poll on Forest and Greenery (1993); Poll on Forest and Living (1999); Cabinet Office, Poll on Forest and Living (2003, 2007 2011, 2019 and 2023).

In addition, since the seas surround Japan and frequent earthquakes occur due to the multiple tectonic plates in and around the territory, the tsunami generated by these earthquakes causes severe damage to the coastal areas as well. The tsunami resulting from by the Great East Japan Earthquake in March 2011 claimed many lives. Coastal forests provided a certain disaster reduction function against the tsunami, which led to their re-evaluation. However, some coastal forests suffered devastating damage. Today, replantation of coastal forests is under way with the cooperation of the government and people.

Figure viii: Coastal disaster prevention forests four years after planting (Sendai City, Miyagi Prefecture)

The current state of the forestry

In Japan, 69% of the forest area is private forest (12% is publicly-owned forest owned by local governments, such as prefectures, municipalities, and property districts; 57% is privately-owned forest owned by individuals and companies), and 31% is national forest. National forests include forests managed by Forestry Agency and other ministries and agencies.

On the other hand, most privately-owned forests are owned by individual forest owners. According to the Census of Agriculture and Forestry 2020, while the number of forest owners and forest management entities has decreased, the area of forest owners with a forest area of 100 ha or more and the average forest area owned by forest management entities have increased.

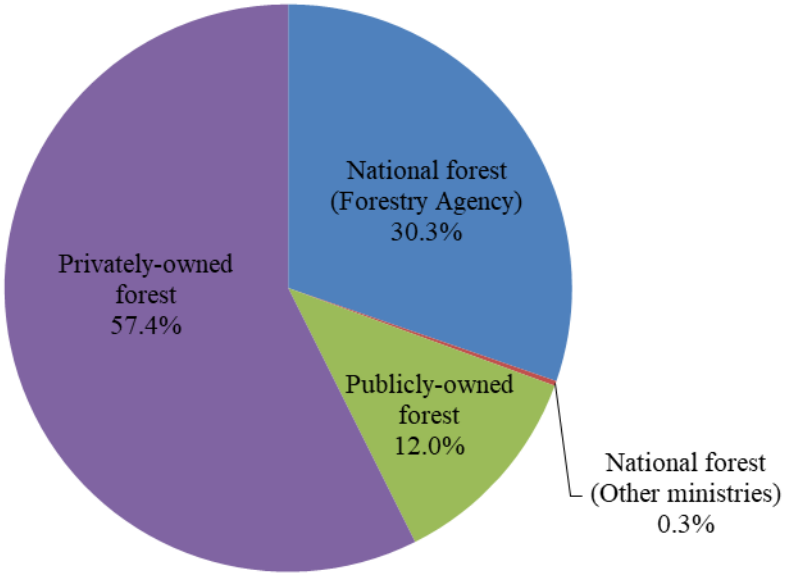


Figure ix: Composition of forests by types of ownership
Source: Forestry Agency, State of Forest Resources (2022).

The current state of the wood industry

In recent years, wood demand in Japan has generally remained below 80 million m^3 in round wood equivalent, but has been on a recovery trend since 2009, when it fell to around 60 million m^3/year following the Lehman shock of the previous year. The largest demand for wood in 2022 was for pulp and chips, accounting for 35% of total consumption, followed by sawn wood (32%) and plywood (12%).

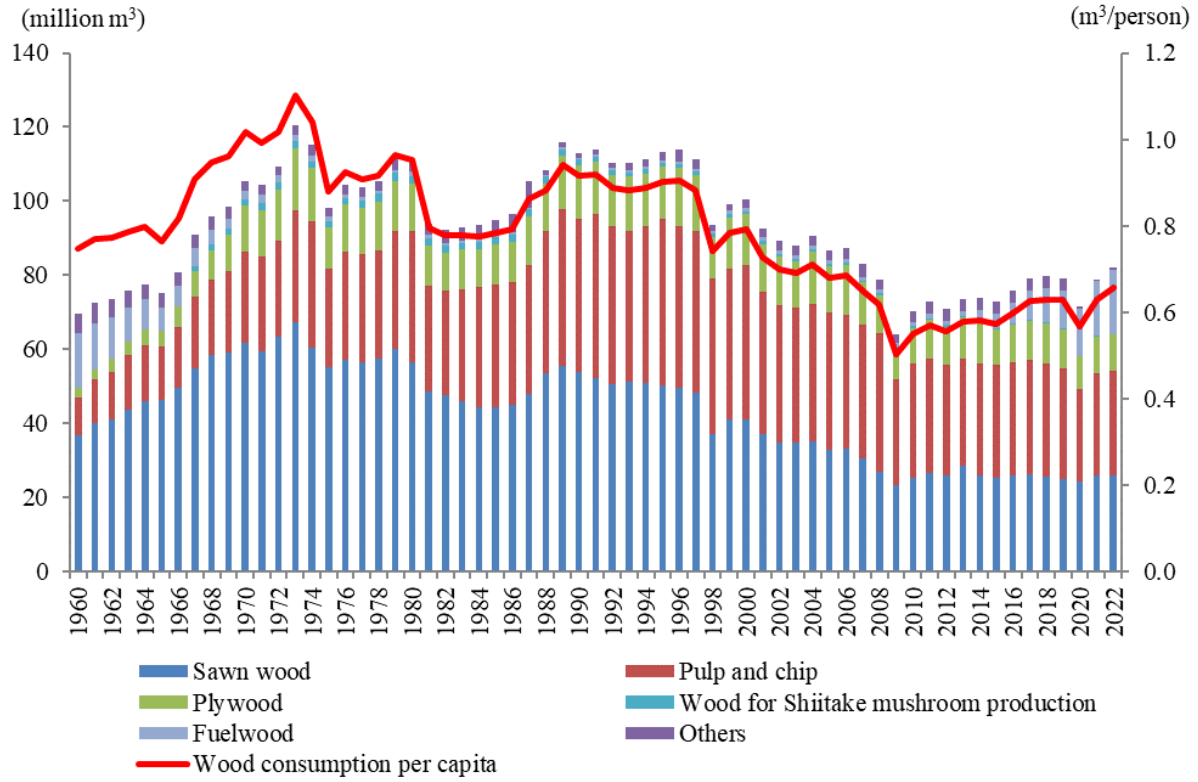


Figure x: Changes in total and per capita consumption of wood and wood products
Source: Forestry Agency, Wood Demand and Supply Chart; MIC, Annual Report Population Estimates.

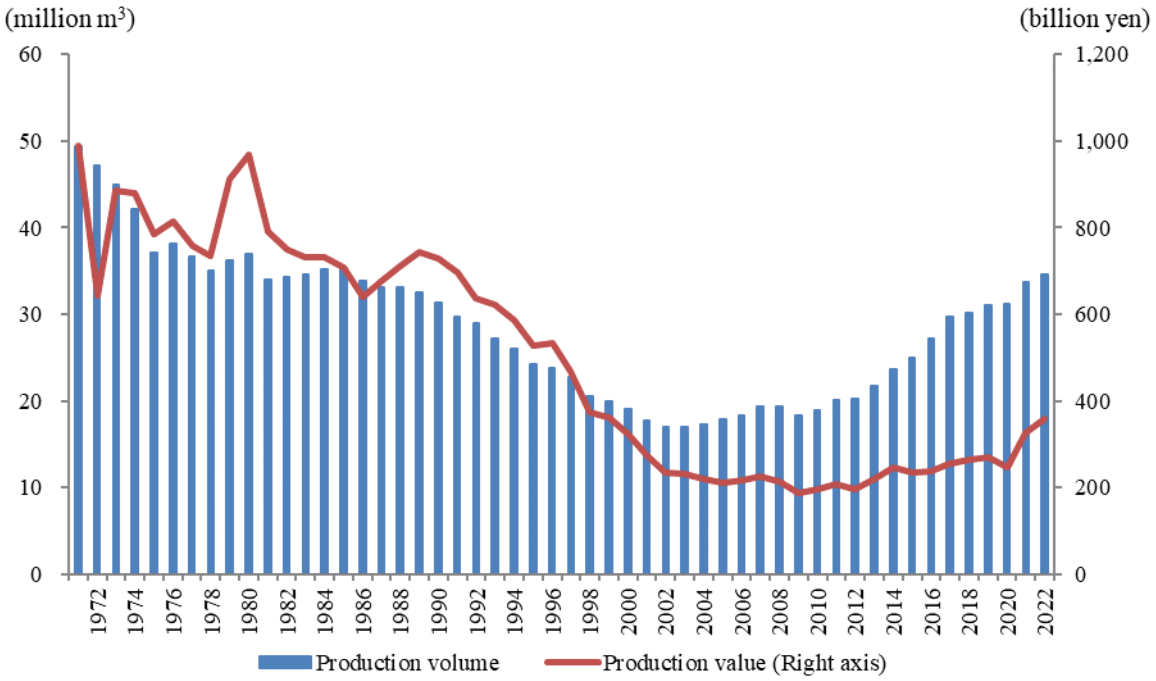


Figure xi: Changes in production volume and value of domestic logs
Source: The figures for timber production are from Forestry Agency, Wood Supply and Demand Chart; the figures for timber production value are from MAFF, Production Forestry Income Statistical Report (up to 2014); MAFF, Forestry Output (from 2015 onwards).

Domestic wood production has recovered to about 35 million m^3 in 2022, accounting for about 40% of the total timber supply, partly due to a decrease in imports due to the yen's depreciation. About 60% of the total wood supply is covered by imported wood consisting of logs, wood products, and fuelwood. While the share of logs among wood imports has been decreasing, the share of chips and other wood products and fuelwood has been increasing in recent years. About 79% of wood imports are chips and other wood products and 14% is from fuelwood.

Domestic wood production has declined accompanied by a fluctuation since the 1960s as a result of competition against imported logs and construction materials other than wood. However, from the early 2000s, the use of small-diameter trees in plywood became possible due to the enhancement of planted forest resources and technological innovations in wood processing. This helped to promote the use of thinned wood from artificial forests, which had been lagging behind. In addition, new trends have been observed. For example, in 2021, the "Act for Promotion of Use of Wood in Public Buildings (enacted in 2010)" was amended and renamed to the "Act for Promotion of Use of Wood in Buildings to Contribute to the Realization of a Decarbonized Society" (It is commonly known as the "Act on the Promotion of Wooden Urban Buildings"), and technological development related to cross laminated timber (CLT) and the rationalization of fire-resistance standards have led to an increase in the number of middle to large-scale buildings being made of wood.

Large building with CLT

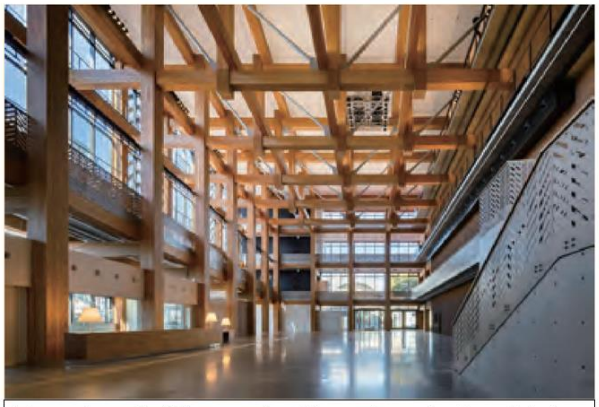
Okayama University

Co-Education & Co-Creation Commons (OUX)

(Okayama City, Okayama Prefecture, completed in January 2023)

Using CLT for walls, beams, etc., a large space with a span of 18 m and flexible wall panel placement on each floor are realized.

(Photo: Kazunari Sato)



Fire-resistant buildings made of fire-resistant laminated timber

Mito City Hall

(Mito City, Ibaraki Prefecture, completed in October 2022)

A four-story fire-resistant building with fire-resistant laminated larch and truss for a large span.

(Photo: Takenaka Corporation)

Figure xii: Examples of large-scale wooden building

Woody biomass, such as lumbering waste, is recycled as raw material for paper and particle board, and combusted for heat utilization at a sawmill. In addition to these uses, biomass has been utilized as fuel for electric power selling under the Feed-in Tariff scheme.

The forestry and wood industry, which had been stagnant for a long period, is expected to play a significant role in the local economy once again with the backdrop of matured planted forests. In 2021, the government formulated a new Basic Plan for Forest and Forestry, which aims to realize "green growth through the forest, forestry, and timber industries" to achieve carbon neutrality by 2050 by developing "new forestry" utilizing new technologies and by adequately managing forests to make the forestry and timber industries more sustainable and growing industries.

The framework of forest administration

The principles of managing Japan's forests are laid down by the Forests and Forestry Basic Act, fully

renovated in 2001, reflecting the international trends toward sustainable forest management. The Act provides that the primary objective of forest management is to sustain the multiple benefits of forests and defines, to this end, a range of policy measures to be implemented for the improvement and conservation of forests and the development of the forestry and wood industry.

In accordance with the Basic Act, the Basic Plan for Forest and Forestry has been periodically formulated (the latest plan was in June 2021) to identify Japan's national strategy which contains long-term goals and approaches.

The Forest Act provides institutional frameworks, such as those for forest planning and conservation, to implement a variety of policy measures. Forest management plans are formulated at the national, district, and municipal levels by the respective government bodies and at the management unit level by the individual forest owners, as well, to ensure the sustainability of the resource base and the multiple functions of forests.

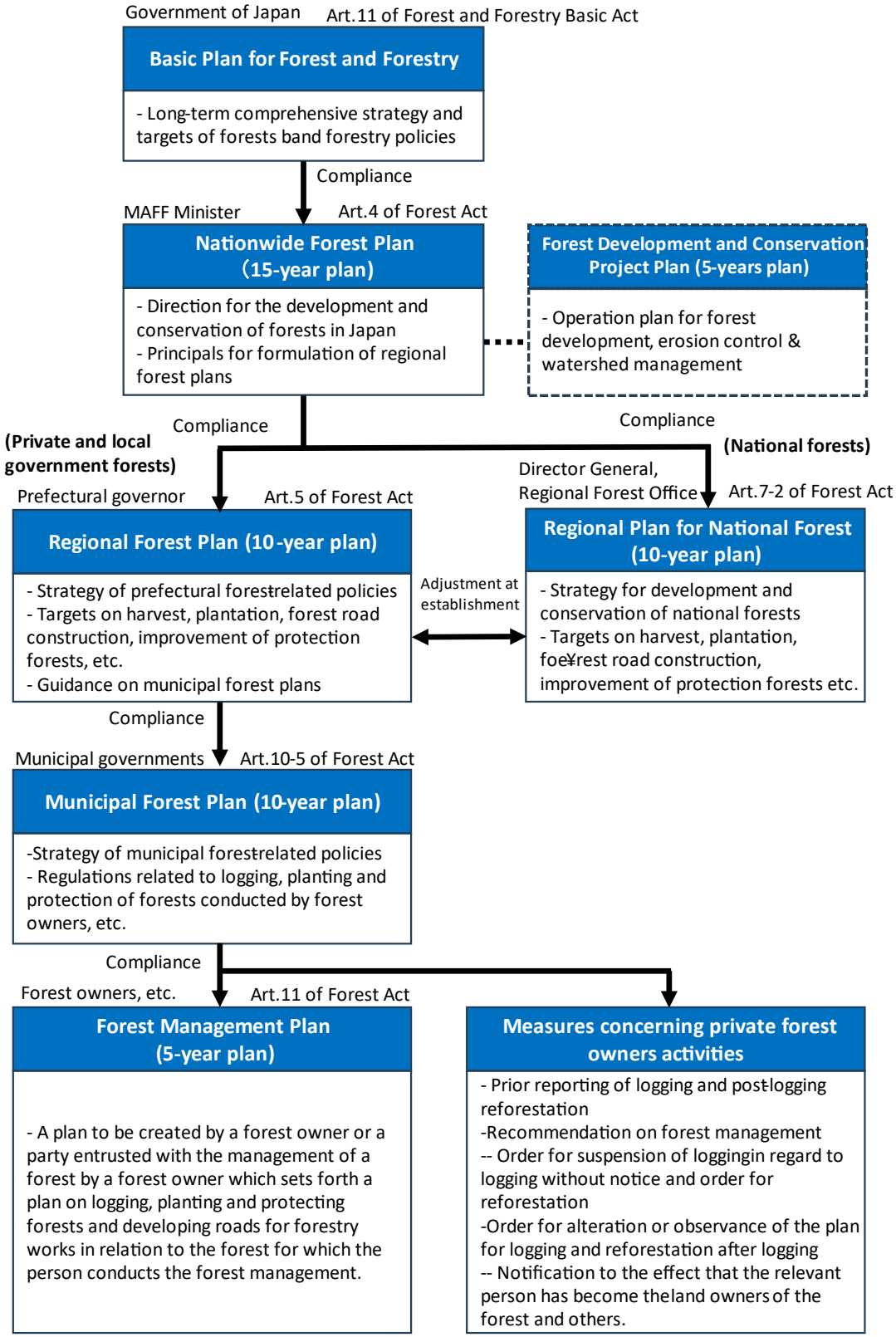


Figure xiii: Structure of forest planning systems
Source: Forestry Agency.

Protection forests are designated by the Minister of Agriculture, Forestry and Fisheries or the prefectural governor to meet various conservation needs, such as soil and water conservation and recreational

opportunities. In protection forests, activities such as logging operations and land development are restricted according to the purpose and degree of conservation required. The total area of protection forests, including those for water and soil conservation, accounts for 49% of the total forest area and 32.5% of the total national land area, respectively, as of FY2022. For private forests other than protection forests, development activities exceeding a specific scale require permission from the prefectural governor. The national government, namely Forestry Agency, and the prefectural and municipal governments work together to provide instruction and assistance to private forest owners and the wood industry.

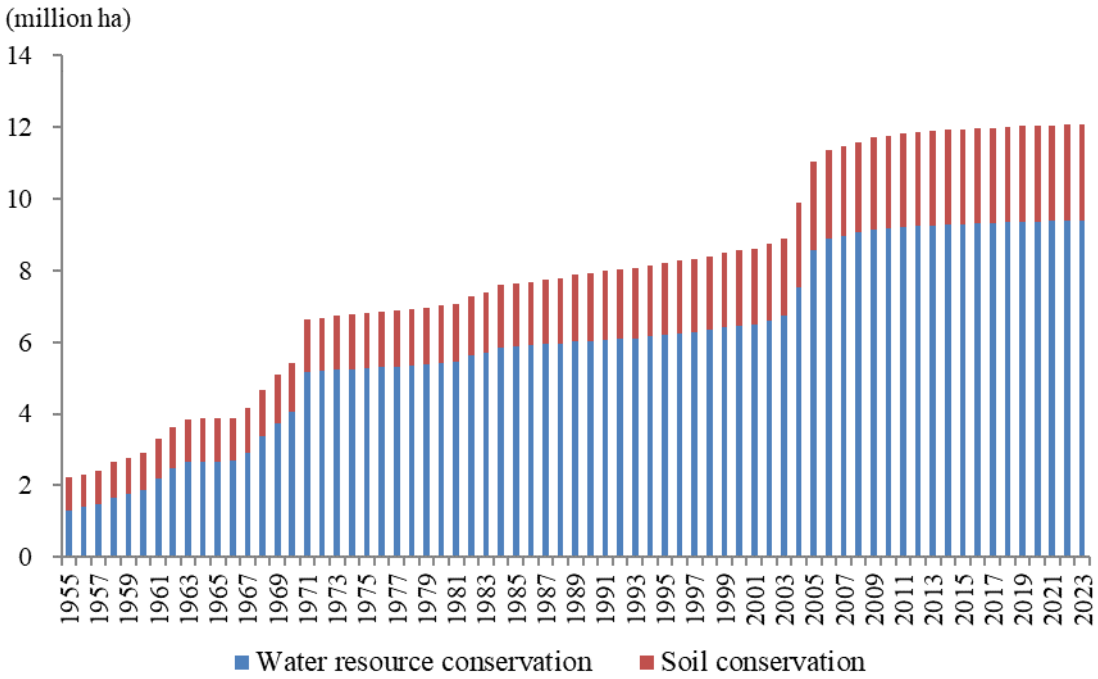


Figure xiv: Changes in the areas of protection forests for soil and water resource conservation

Note: Soil conservation shows the total area of protection forests for soil conservation while water resource conservation shows the total area of protection forests for headwater conservation and drought prevention control.

Source: Forestry Agency.

Forestry Agency manages and operates most national forests as a unified national forest project. In accordance with the Act Concerning Utilization of National Forest Land, Forestry Agency aims to maintain and promote the conservation of national land and other public functions of national forests while contributing to the sustainable and systematic supply of forest products and the promotion of local industry and the improvement of the welfare of residents through the use of national forest land. As of April 2022, there are seven regional forest offices and 98 district forest offices under Forestry Agency throughout Japan.

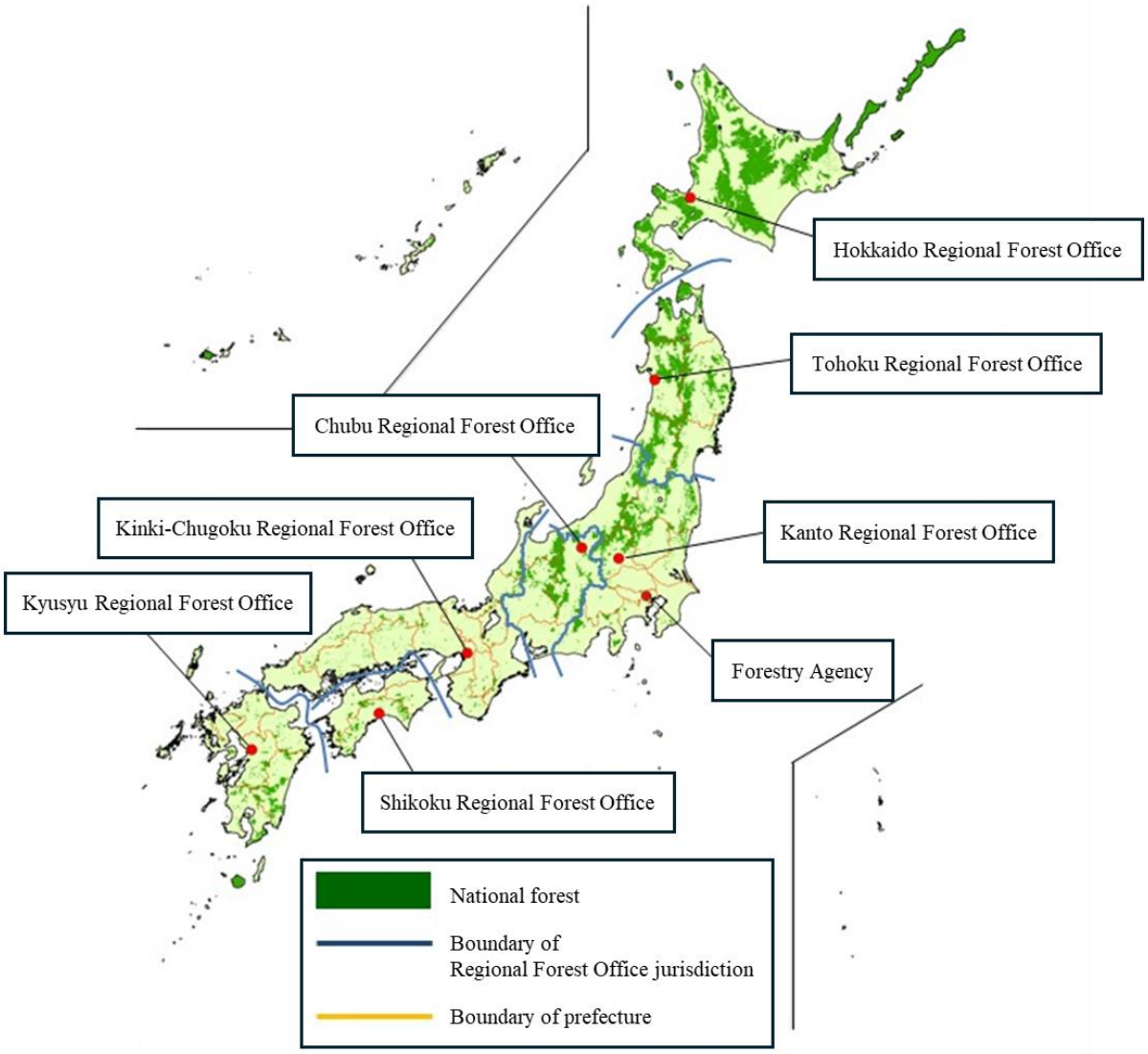


Figure xv: Distribution of national forests of Japan

Source: Forestry Agency.

A variety of research and development activities related to forests and forest products are carried out collaboratively or solely by national, prefectural, and private institutions and universities, including the Forestry and Forest Products Research Institute (FFPRI). The newly developed stock seeds for planting are distributed by the Forest Tree Breeding Center (FTBC) of FFPRI to prefectures and other organizations, and seeds are produced there for seed/seedling production by private sectors.

National Forest Inventory survey

With regard to data on forests, forest register data is collected and organized for each forest sub-compartment in all forests nationwide, including private forests, and is reviewed every five years when the regional forest plan and the regional forest plan for national forests are revised.

In addition to supplementing the existing forest inventory data, Forestry Agency has also been conducting a nationwide forest inventory survey since 1999 with the aim of providing data for the Montréal Process reports. The National Forest Inventory (NFI) survey collects a wide range of information on approximately 13,000 monitoring plots installed at 4 km grid points across the country, including information on vegetation and endangered species, in a five-year cycle.

The 1st survey (1999 to 2003) and 2nd survey (2004 to 2008) were named "Forest Resource Monitoring Survey," and the 3rd survey (2009 to 2013) onward was called "Basic Survey on Forest Ecosystem Diversity." As of 2024, the 5th survey (2019 to 2023) was completed. The survey is now in its sixth cycle, which began in 2024.

The results of the surveys up to the 4th survey (2014-2018) have been used in this national report and the Food and Agriculture Organization of the United Nations (FAO)'s Global Forest Resources Assessment 2020 (FRA 2020).

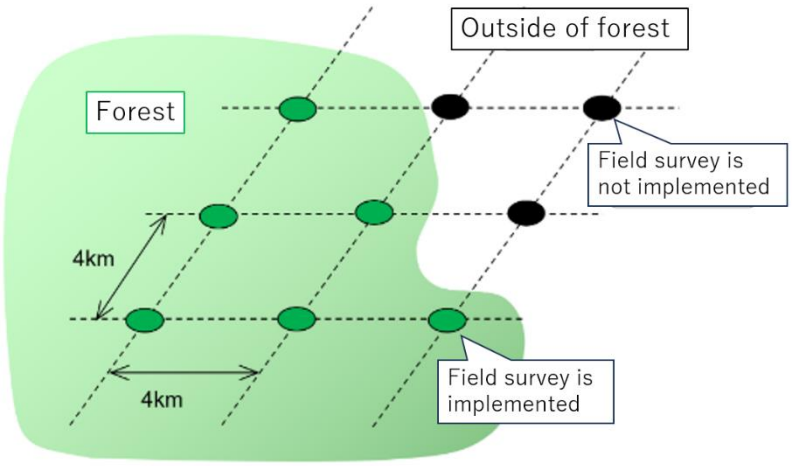


Figure xvi: Structure of plot of National Forest Inventory survey

Source: Forestry Agency.

Future Issues

The analysis of forest area by forest ecosystem type shows little change over the past 20 years. However, it is necessary to analyze the impact of global warming and other factors on forest ecosystems in our country and to grasp the actual situation using statistical methods so that countermeasures can be considered as necessary.

"Green growth through the forest, forestry, and timber industries" has been identified as one of the key policies of the government of Japan. The forestry and wood industries are showing positive signs due to maturing forest resources, which is increasing people's expectations regarding wood production function. However, many issues remain to be addressed, such as cost reduction of timber production and reforestation.

In addition, due to global climate change, disasters in mountainous areas are becoming more severe, and their forms of occurrence are changing. To prevent and reduce the damage caused by mountain disasters, it is necessary to promote appropriate management and conservation of forests and the development of forest conservation facilities.

As for mitigation measures for climate change, it is also important to ensure the function of the forest as a carbon sink through forest management and conservation and that of CO_2 storage and emission reduction through wood use.

The government of Japan recognizes the need to provide adequate forest-related information, including the roles of forests, forestry and the wood industry, as well as their importance, for better public understanding and to take necessary measures systematically and effectively with the participation of various stakeholders.

Introduction: About the Montréal Process

Development of the Montréal Process

Since the Earth Summit (UNCED) held in Rio de Janeiro in 1992, the promotion of sustainable forest management has become an internationally important challenge. In this context, initiatives to develop criteria and indicators as "measures" for objective monitoring of the sustainability of forest management have advanced in many regions of the world. FAO reports that there are nine criteria/indicator developing processes, including the process by European countries and EU (Forest Europe) and the process by tropical timber exporting countries that are members of the International Tropical Timber Organization (ITTO), and that about 150 countries are participating in one or more processes.

The Montréal Process is an initiative to promote the development and application of criteria and indicators for the conservation and sustainable management of temperate and boreal forests. Its 12 member countries are Argentina, Australia, Canada, Chile, China, Japan, the Republic of Korea, Mexico, New Zealand, Russia, Uruguay, and the United States of America. The initiative is named after the venue of the expert seminar on sustainable forest management of temperate and boreal forests held in 1993 in Montréal, Canada, where the discussion started. Since the Working Group was formed in 1994, it has been working on the development and revision of criteria/indicators, collection of data based on the indicators, and development of country reports.

Today, the criteria and indicators of the Montréal Process consist of the following seven criteria and 54 indicators.

Criterion 1: Conservation of biological diversity (9 indicators, including the area of forests by forest ecosystem types and the number of forest-associated species)
Criterion 2: Maintenance of productive capacity of forest ecosystems (5 indicators, including the area and growing stock of forestland available for wood production, and area of plantations)
Criterion 3: Maintenance of forest health and vitality (2 indicators, including the area of forests affected by pests, fire, etc. beyond the normal range)
Criterion 4: Conservation and maintenance of soil and water resources (5 indicators, including the area of forests whose designation or land management focus is the protection of soil or water resources)
Criterion 5: Maintenance of forest contribution to global carbon cycles (3 indicators, including total forest ecosystem carbon pools and fluxes)
Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of society (20 indicators, including the percentage of recycling of forest products, and value of investment in the forest sector)
Criterion 7: Legal, institutional, and economic framework for forest conservation and sustainable management (10 indicators, including legal and policy frameworks, cross-sectoral coordination, and monitoring/assessment abilities)

The approach of criteria and indicators

In the Montréal Process, "criteria" are aspects of forests and forest management to be addressed in assessing the sustainability of forest management, while "indicators" are items on which measurements and information are collected to describe the state of forest and forest management along the criteria. Various discussions have been held on sustainable forest management in the international community since the Earth Summit. The non-legally binding instrument on all types of forests (NLBI) (A/RES/62/98) adopted at the United Nations General Assembly in December 2007 presented a concept of sustainable forest management "as a dynamic and evolving concept, aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations" (para. 4). It also states that the member states consider the seven thematic elements of sustainable forest management as a reference framework for sustainable forest management and, in this context, identify, as appropriate, specific environmental and other forest-related aspects within those elements for consideration as criteria and indicators for sustainable forest management (para. 6(b)).

Individual criteria/indicator processes adopted their criteria and indicators for sustainable forest management based on the natural, social, and other conditions of the regions, but there are also international initiatives to standardize definitions of terms, harmonize reporting, and reduce the burden of reporting. For the development of the Global Forest Resources Assessment 2015 for example, C&I processes including Forest Europe, the Montréal Process, ITTO, and FAO cooperated to establish the Collaborative Forest Resources Questionnaire (CFRQ) Partnership.

The 2030 Agenda for Sustainable Development, adopted at the United Nations Sustainable Development Summit in September 2015, set forth Sustainable Development Goals (SDGs) consisting of 17 goals and 169 targets for the international community to achieve by 2030. The agenda suggests that many of the 17 goals are related to the promotion of sustainable forest management. Goal 15 (terrestrial resources) incorporates targets such as promotion of the implementation of sustainable forest management and increase of afforestation and reforestation globally. It has been agreed that the progress of SDGs will be measured using the indicators established for each target and 232 indicators in total. The criteria and indicators of the Montréal Process will be useful also for the assessment of the progress of SDGs.

The criteria and indicators of the Montréal Process are an effort to assess the sustainability of forest management at the national or state level. There are also initiatives where third-party organizations certify forests at the management unit level based on certain criteria of the sustainability of forest management, consideration of environmental conservation, and other factors. The certification standards of the Sustainable Green Ecosystem Council (SGEC) Certification Scheme, which were set up as Japan's unique private-driven forest certification scheme, are regarded as based on the indicators of the Montréal Process.

Operation of the Montréal Process

The Montréal Process is operated by the Working Group, which is the decision-making body consisting of the representatives of the member states; the Technical Advisory Committee, which studies technical issues based on the request of the Working Group; and the Secretariat for liaison and coordination of related parties.

The Working Group holds an annual meeting for which the member states take turns to provide the venue. The host country takes the chair.

The Canadian government served as the secretariat for the liaison and coordination of related parties from 1995 to 2006, but from 2007 to 2019, Japan (Forestry Agency) took on this role. From 2020 onwards, China has been acting as the secretariat.

The Technical Advisory Committee consists of forestry experts of all member states. The committee collects data and provides the Working Group with technical and scientific advice on matters related to indicator measurement and reports.

Guiding principles for drafting the 4th Country Report

There are various needs for international reporting concerning forest and forestry according to the purpose, which includes country reports based on the Convention on Biological Diversity or the United Nations Framework Convention on Climate Change, FRA, which was compiled and published by FAO based on forest and forestry statistics of individual countries, and voluntary country reports at the United Nations Forum on Forests (UNFF). It has become a challenge to ensure effective reporting while avoiding duplication.

The Forest and Forestry Basic Act obliges the government to create Annual Report on Forest and Forestry after consulting the Forestry Policy Council, and to submit the report to the Diet. The report is uploaded on the website of Forestry Agency. The abridged edition is translated into English.

The country report of the Montréal Process aims to analyze and explain the current state and challenges of Japan's forest, forestry and wood industry based on the seven criteria for sustainable forest management. Japan has so far prepared the 1st Country Report in 2003, the 2nd Country Report in 2009, and the 3rd Country Report in 2019.

The 4th Country Report, which is prepared this time, is a summary of the changes in the situation surrounding Japan's forests, forestry, and wood industry since the 3rd Country Report, including trends and changes, based on the 54 indicators revised in 2009 and the "Technical Guidelines for the Implementation of the Criteria and Indicators of the Montréal Process, Criteria 1-7 (3rd Edition)" (hereinafter referred to as the 'Technical Guidelines') revised in 2014.

Each indicator consists of two parts: "Commentary" and "Current State and Trends." The "Commentary" section provides a translation of the "Rationale" set out in the "Technical Guidelines" to explain the concept of the indicators agreed upon in the Montréal Process in an easy-to-understand manner. The "Current Status and Trends" section basically reports in line with the approach set out in the "Commentary" from the perspective of improving the comparability of international data, but also describes to the extent possible the situation of forests and forestry that is unique to Japan and policy issues of high priority in Japan.

For quantitative data, the basic approach is to use official statistics from Forestry Agency and other relevant ministries, but for Criteria 1 to 4, approximately 13,000 monitoring plots' data (in the case of the fourth survey) from the 1st to 4th National Forest Inventory survey are also used.

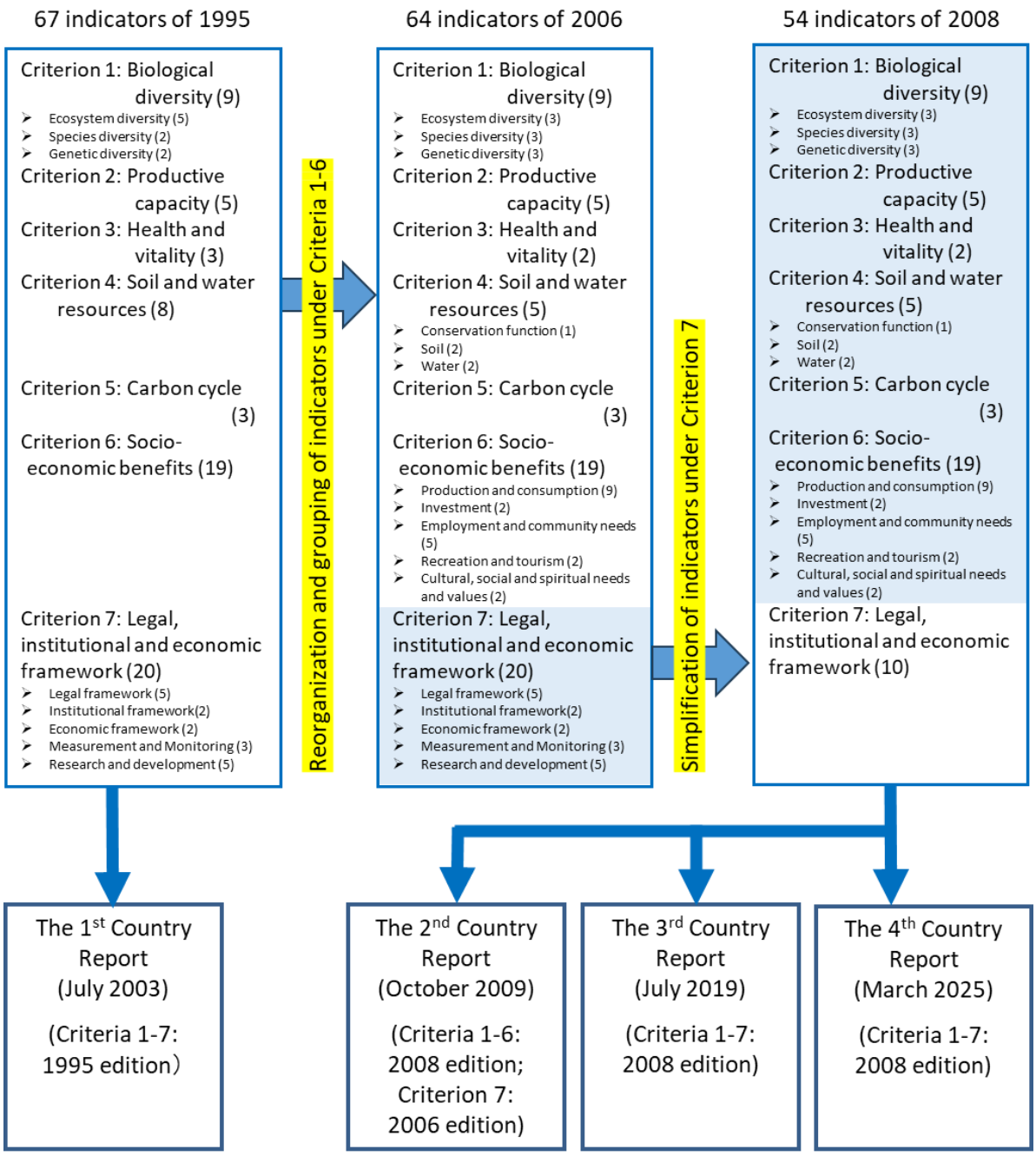


Figure 1: Changes in Criteria and Indicators used for development of Country Reports

Criterion 1: Conservation of biological diversity

Forests, and particularly native forests, support a substantial proportion of the planet's biological diversity and terrestrial species. Biological diversity enables an ecosystem to respond to external influences, to recover after disturbance, and to maintain essential ecological processes.

Human activities and natural processes can impact adversely on biological diversity by altering and fragmenting habitats, introducing invasive species, or reducing the population or ranges of species. Conserving the diversity of organisms and their habitats supports forest ecosystems and their ability to function, reproduce, and remain productive.

1.1 Ecosystem diversity

Maintenance of the variety and quality of forest ecosystems is necessary for the conservation of species. Without sufficient habitat size, adequate connectivity, necessary structural diversity and appropriate protection and management measures, species may decline and become vulnerable to extinction.

These indicators provide information on the area and extent of ecosystem types, forest area under formal protection and the effects of fragmentation.

1.1.a Area and percent of forest by forest ecosystem type, successional stage, age class, and forest ownership or tenure

Rationale

This indicator provides information on the area and extent of forest ecosystem types, including successional stage, age class and the nature of tenure or ownership. The sustainability and stability of forest ecosystems may depend on their size and diversity. If these are not maintained, forests may become vulnerable to habitat degradation and loss. Tenures or ownership types may have a variety of management regimes associated with them - each with a different impact on biological diversity.

Current Status and Trends

(Distribution of Forests)

Japan is an archipelago that extends approximately 3,000 km from east to west and north to south. Boreal, cool temperate, warm temperate, and subtropical forests are distributed according to the various climatic zones. High-altitude areas of western Honshu, Shikoku, and Kyushu also harbor cool temperate forests. The average annual rainfall is approximately 1,718 mm, with a wide variation depending on the area.

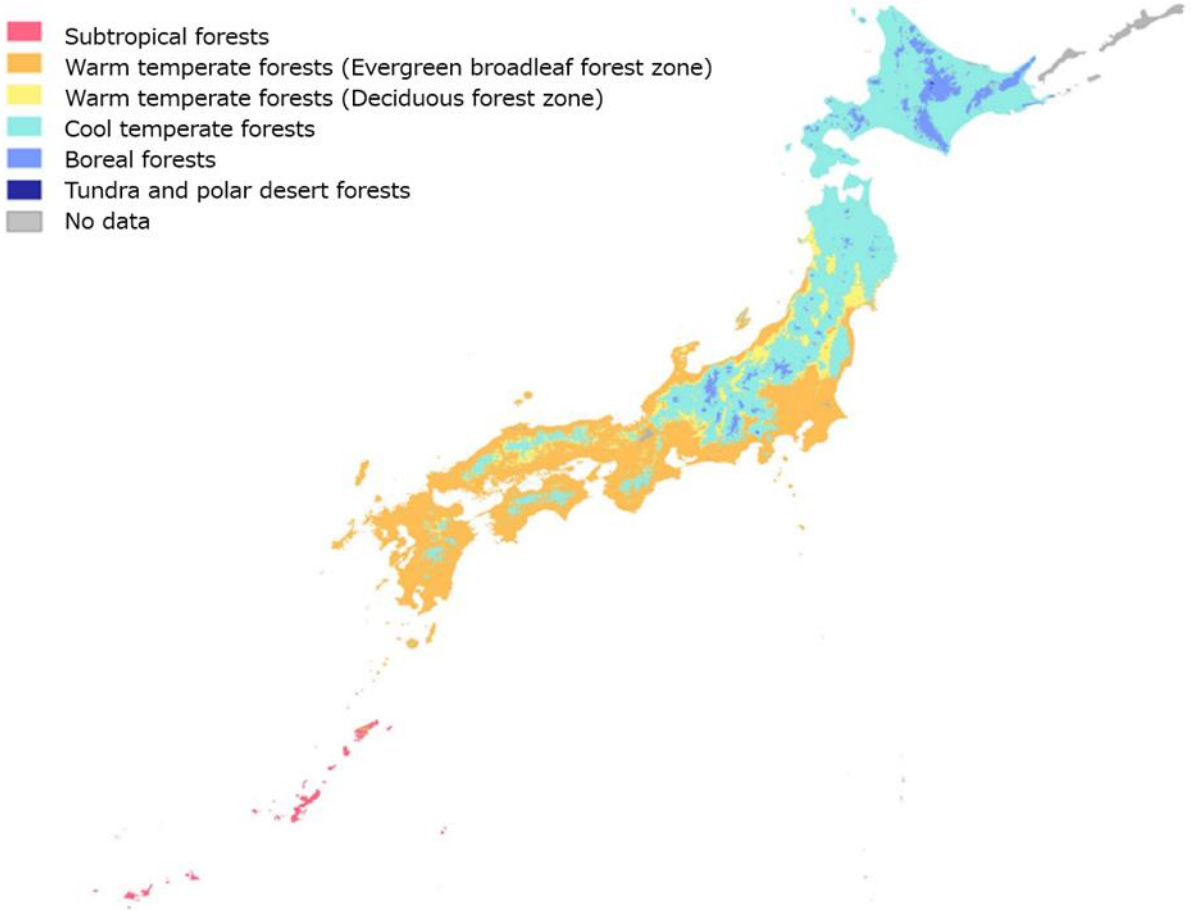


Figure 2: Vegetation zone in Japan

Source: Created by Forestry Agency based on Kira's Warmth Index; JMA, National Land Data (Mean Annual Mesh Data).

(Forest area)

The total area of Japan's forests is approximately 25 million ha, which corresponds to about two-thirds of the total land area. While the coverage of forests has been maintained for more than 70 years, their composition has been changing. In 1951, the forest area was composed of approximately 20% of planted forests and approximately 70% of natural forests. Since 1980, planted forests accounted for approximately 40% of the

total forest area, while natural forests accounted for approximately 50%. This change is mainly due to the active promotion of the establishment of planted forests consisting of Japanese cedar or Japanese cypress, etc., since the late 1950s. The situation of planted forests is described in detail in Indicator 2.b.

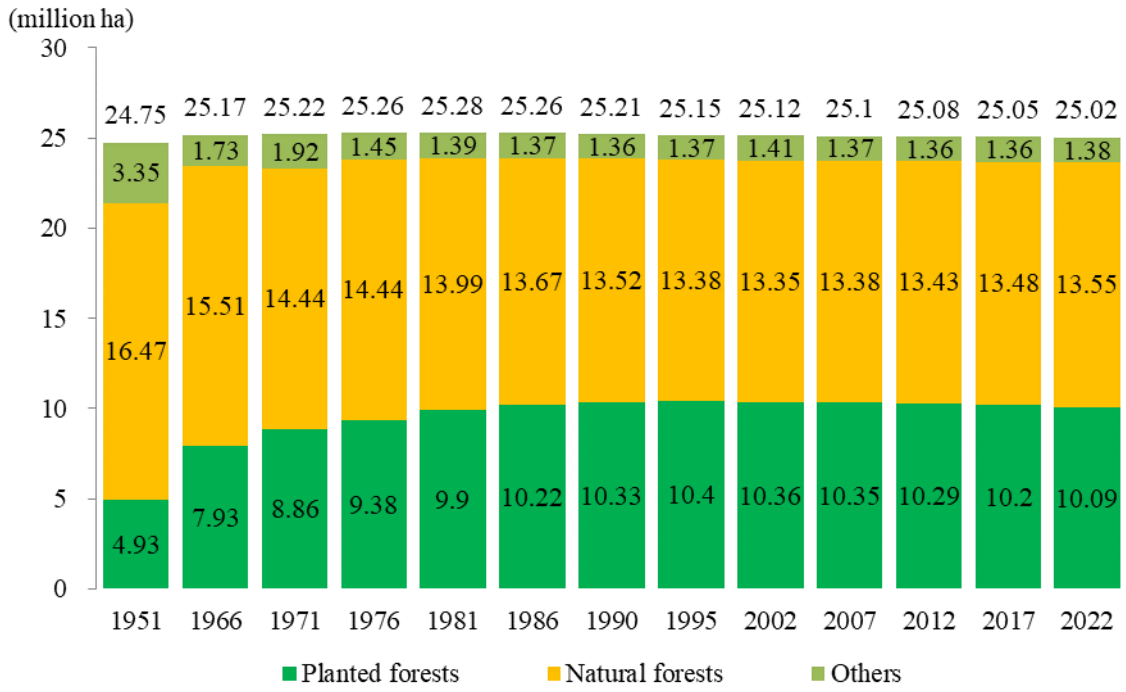


Figure 3: Changes in forest area of Japan

Note: Discrepancies in totals are rounded.

Source: MAFF, Statistics Charts (1951 only); Forestry Agency, State of Forest Resources (from 1966 onwards).

(Types of Forest Ecosystems)

According to the 4th National Forest Inventory survey (from 2014-2018), the types of forest ecosystems in Japan were as follows: 50% of forests where coniferous tree species are dominant, 44% of forests where broad-leaved tree species are dominant, and 6% of other forests. Among them, coniferous forests are composed of 20% Japanese cedar (*Cryptomeria japonica*) and 10% Japanese cypress (*Chamaecyparis obtuse*); broad-leaved forests are composed of 10% deciduous oaks (*Quercus* spp.) and 4% each of beech (*Fagus crenata*) and Japanese Castanopis species and evergreen oak (*Castanopsis* spp. and *Quercus* spp.).

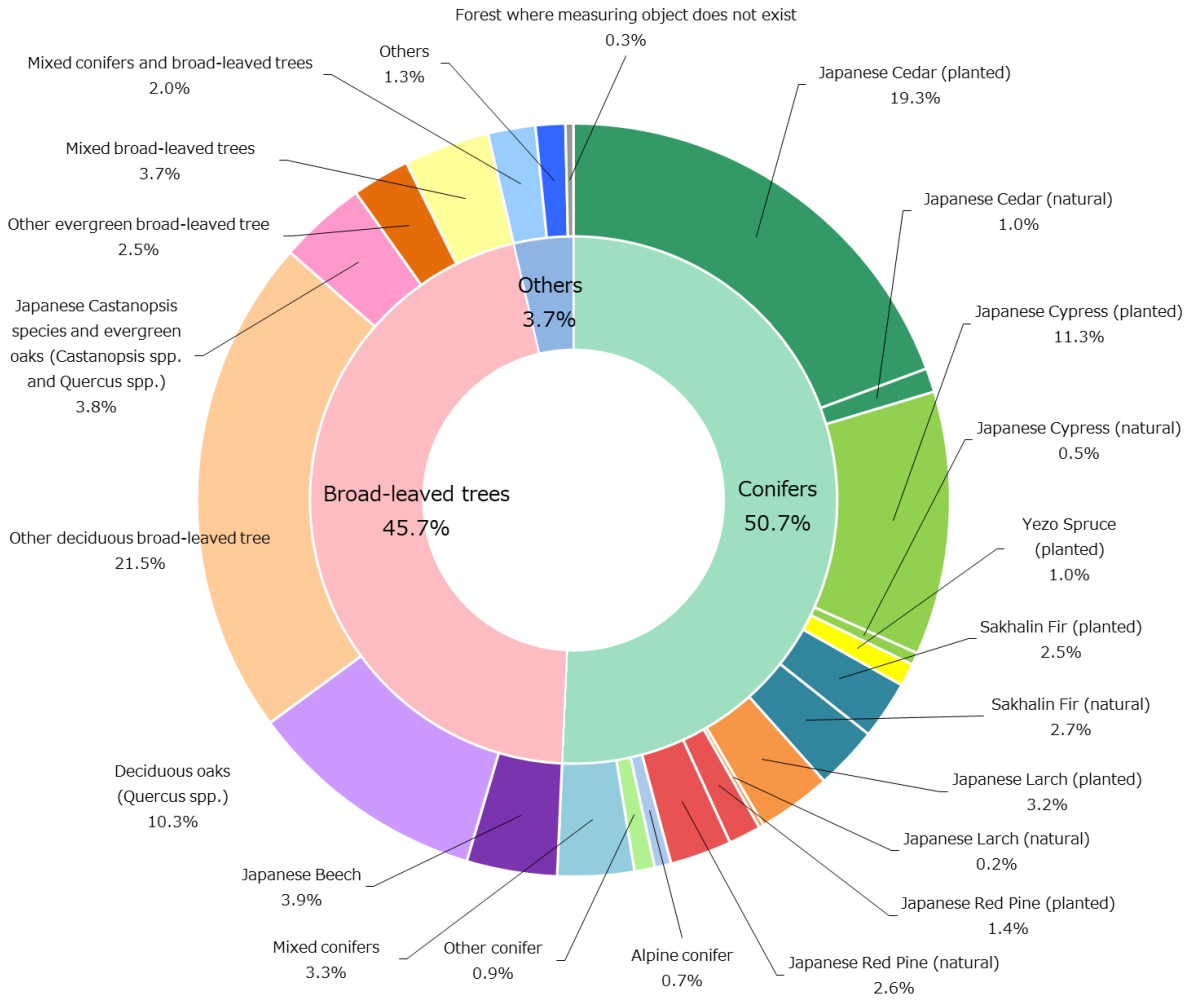


Figure 4: Composition of forest ecosystem types by dominant tree species

Note: Aggregated based on the dominant tree species, which are tree species occupying more than 30% of the total basal area of tree species that appear in the spot.

Source: Forest Agency, the 4th National Forest Inventory survey.

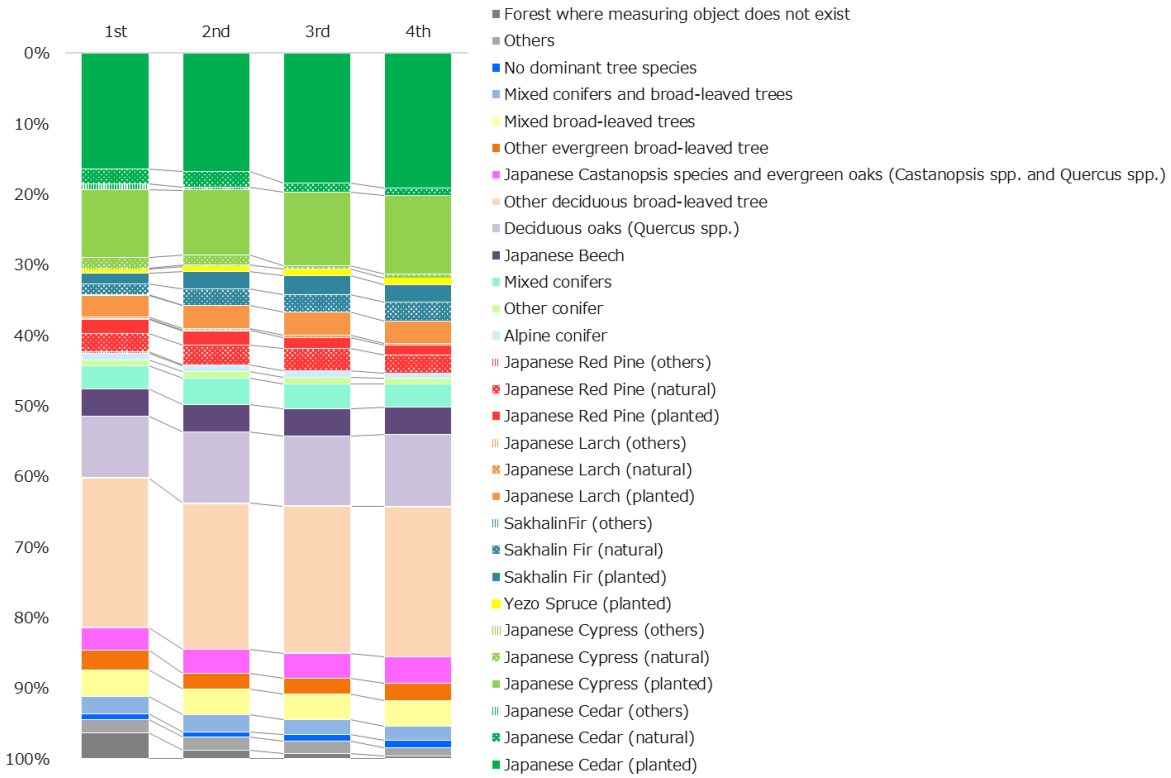


Figure 5: Changes in composition of forest ecosystem types

Note: Classification for planted/natural forests and others is based on the forest inventory for the 1st and 2nd survey, and on the ground survey for the 3rd and 4th survey.

Source: Forest Agency, the 1st to 4th National Forest Inventory surveys.

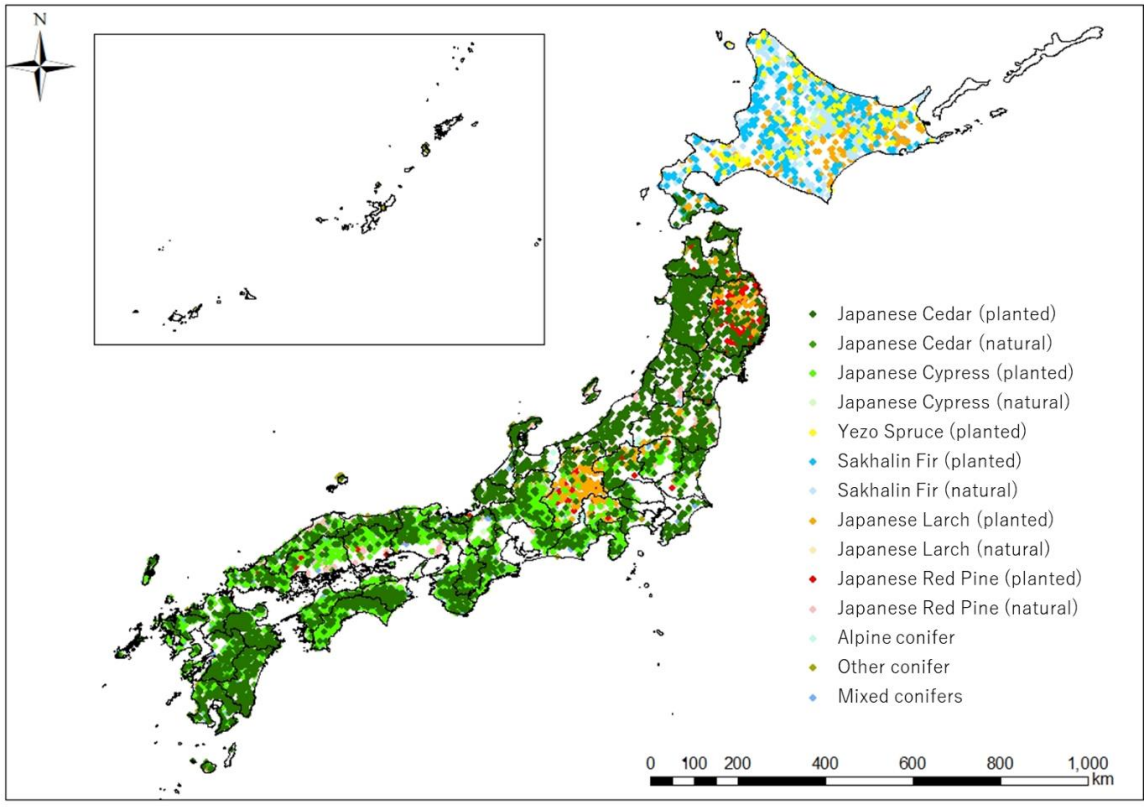


Figure 6: Distribution of forest ecosystem types (conifers)

Source: Forestry Agency, the 4th National Forest Inventory survey.

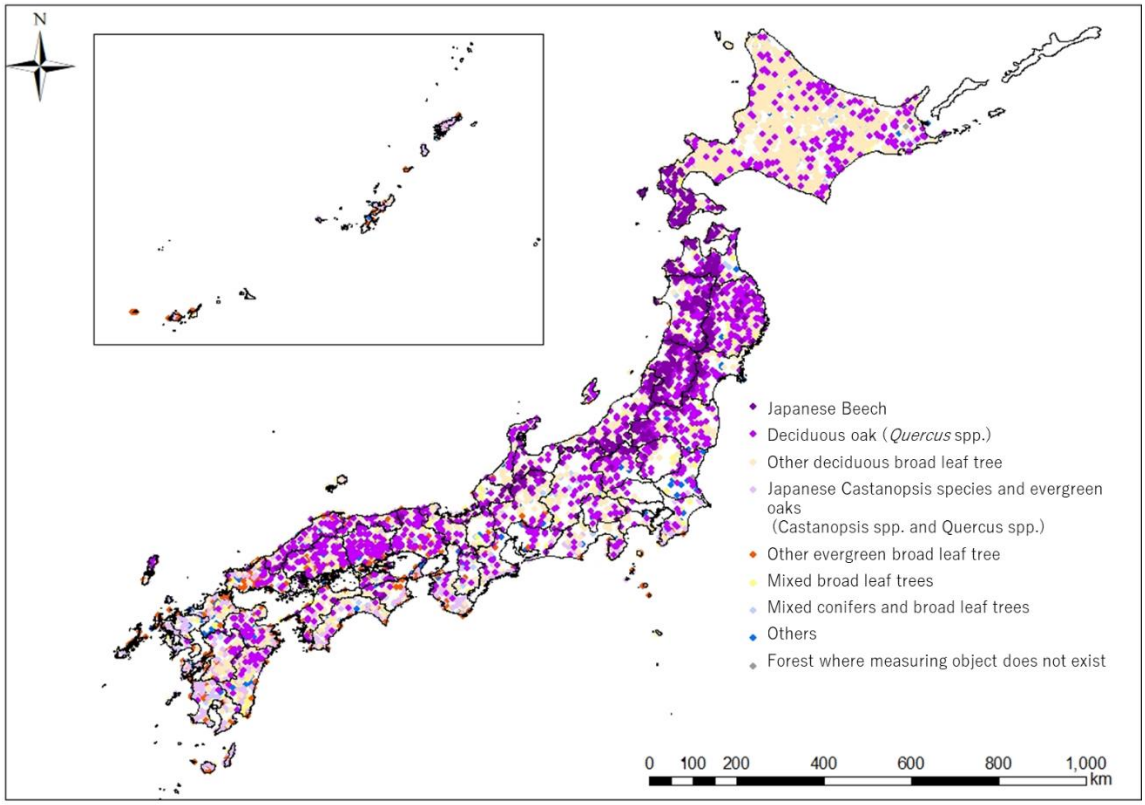


Figure 7: Distribution of forest ecosystem types (broad-leaved trees and others)
Source: Forestry Agency, the 4th National Forest Inventory survey.

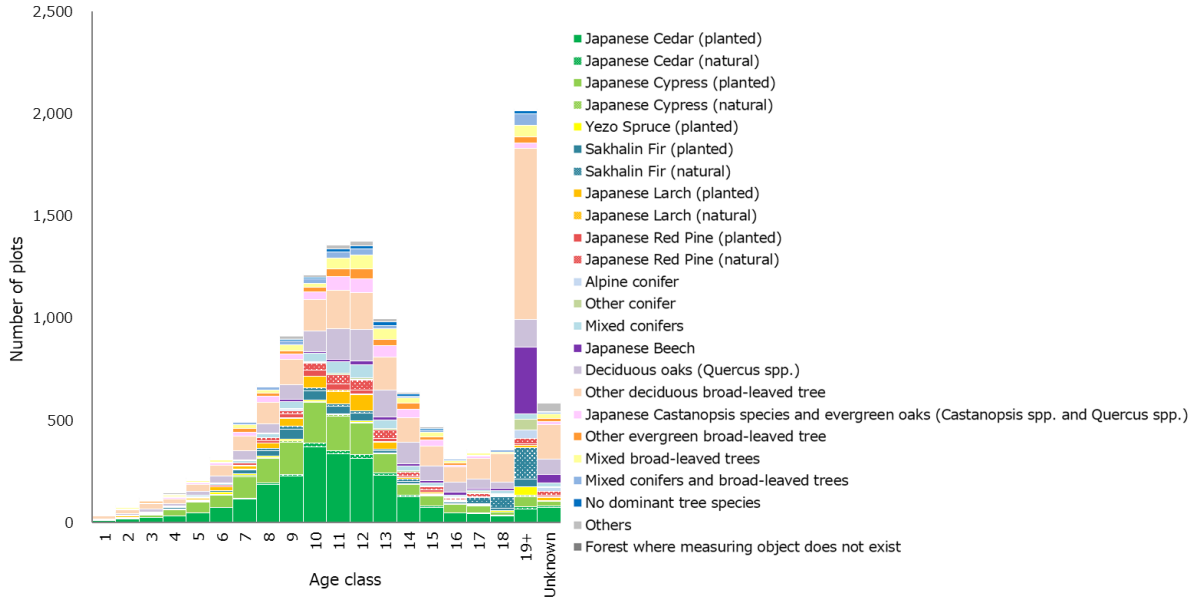


Figure 8: Composition of forest ecosystems by age class
Source: Forestry Agency, the 4th National Forest Inventory survey.

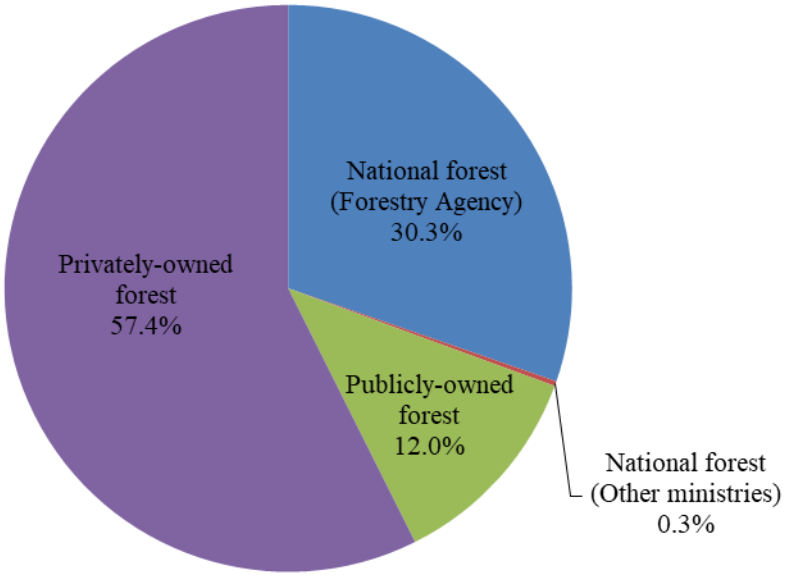


Figure 9 Composition of forests by types of ownership
Source: Forestry Agency, State of Forest Resources (2022).

(Forest ownership)
In Japan, 69% of forests are private forest, and 31% are national forest. Private forests include publicly owned forest and privately owned forests. 57% of the forest area is publicly owned and 12% is privately owned. Publicly owned forests belong to local public entities, including prefectural and municipal governments and the communal districts. Privately owned forests belong to individuals and companies. National forests include those managed by Forestry Agency and those managed by other ministries and agencies.

1.1.b Area and percent of forest in protected areas by forest ecosystem type, and by age class or successional stage

Rationale

This indicator provides information on the area and extent of forest by ecosystem type, age class or successional stage protected to safeguard biological diversity and representative examples of forest ecosystem types. This indicator will also help identify forest types of conservation value that are in need of protection. The level of formal protection given to forests is a reflection of the importance society places on their conservation.

Current status and trends

In Japan, forests protected mainly for conserving forest ecosystems include the forests designated as follows: natural parks (Natural Parks Act), nature conservation areas (Nature Conservation Act), wildlife protection areas (Wildlife Protection, Control and Hunting Management Act), natural habitat protection areas (Act on Conservation of Endangered Species of Wild Fauna and Flora) designated special mother tree stands (Forestry Seeds and Seedlings Act), Historic sites, places of scenic beauty and natural monuments (Act on Protection of Cultural Properties), protected forests and the Green Corridors.

Aichi Target 11 under the Convention on Biological Diversity sets a goal to conserve at least 17% of the terrestrial and inland water areas through the management of protected areas, etc. In this regard, Japan has reported in the 6th National Report of the Convention on Biological Diversity (December 2018) that approximately 20.3% of the terrestrial and inland water areas were being conserved and managed as protected areas in FY2011.

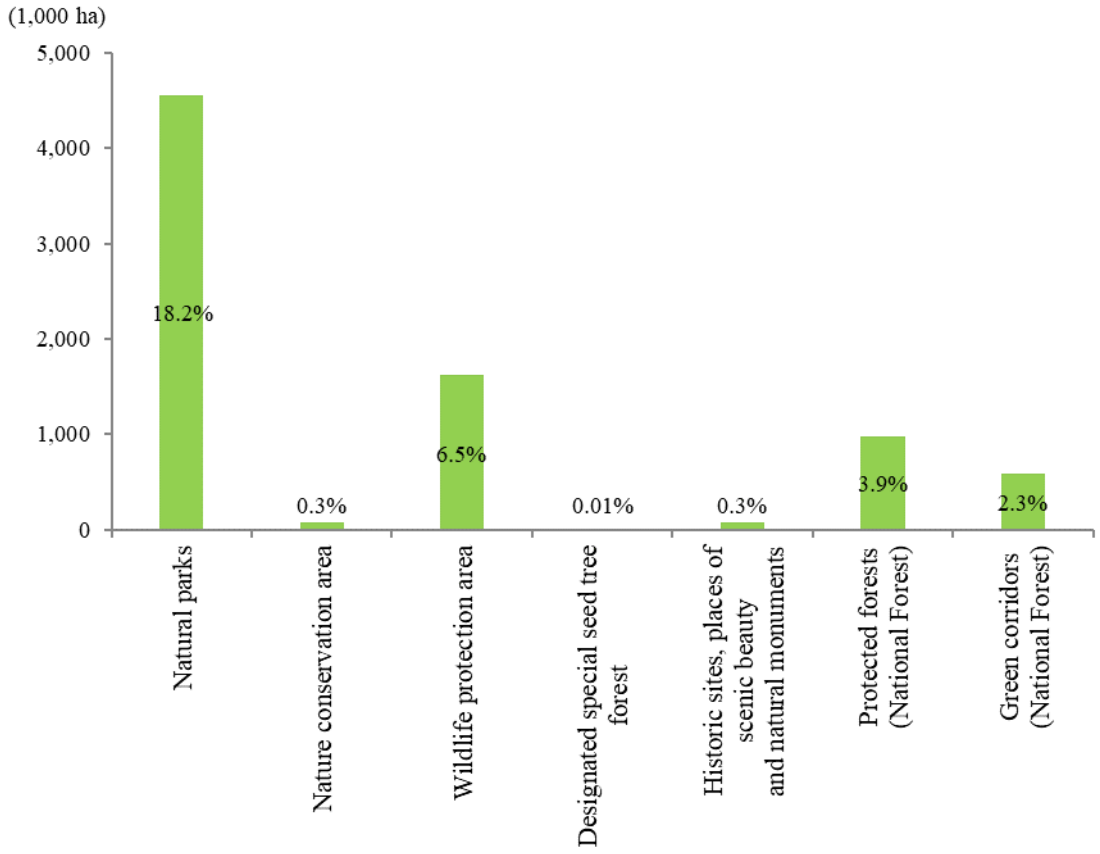


Figure 10: Area of forests in protected areas and the ratio to the total forest area (2022)

Note: The areas of forest include overlapping areas.

Source: Forestry Agency.

(Forest Ecosystems)
According to the 4th National Forest Inventory survey (2014-2018), the forest ecosystems in protected areas consisted of 48% of forests where coniferous tree species are dominant, 48% of forests where broad-leaved tree species are dominant, and 4% of other forests. The proportion of forest types found in protected areas was similar to the overall trend, except for a slightly smaller area of forests dominated by coniferous species, and planted coniferous forests accounted for 33% of the protected areas.

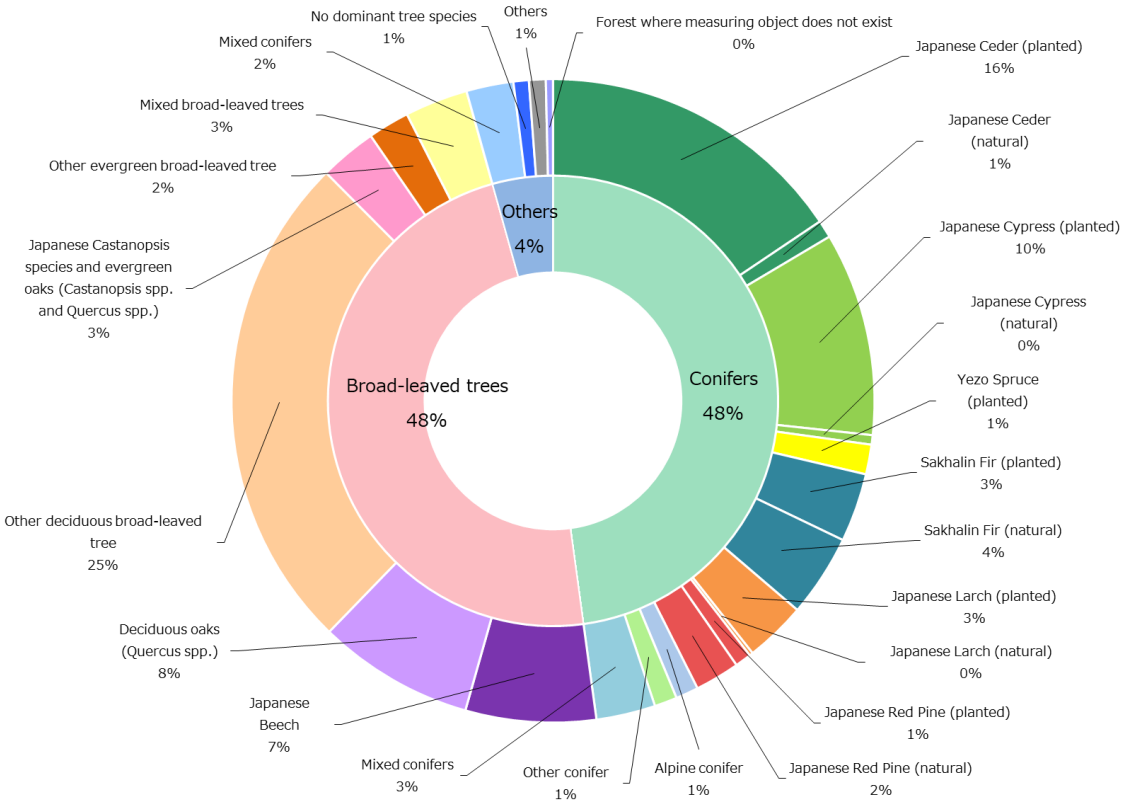


Figure 11: Composition of forest ecosystem types by dominant tree species in protected areas
Source: Forest Agency, the 4th National Forest Inventory survey.

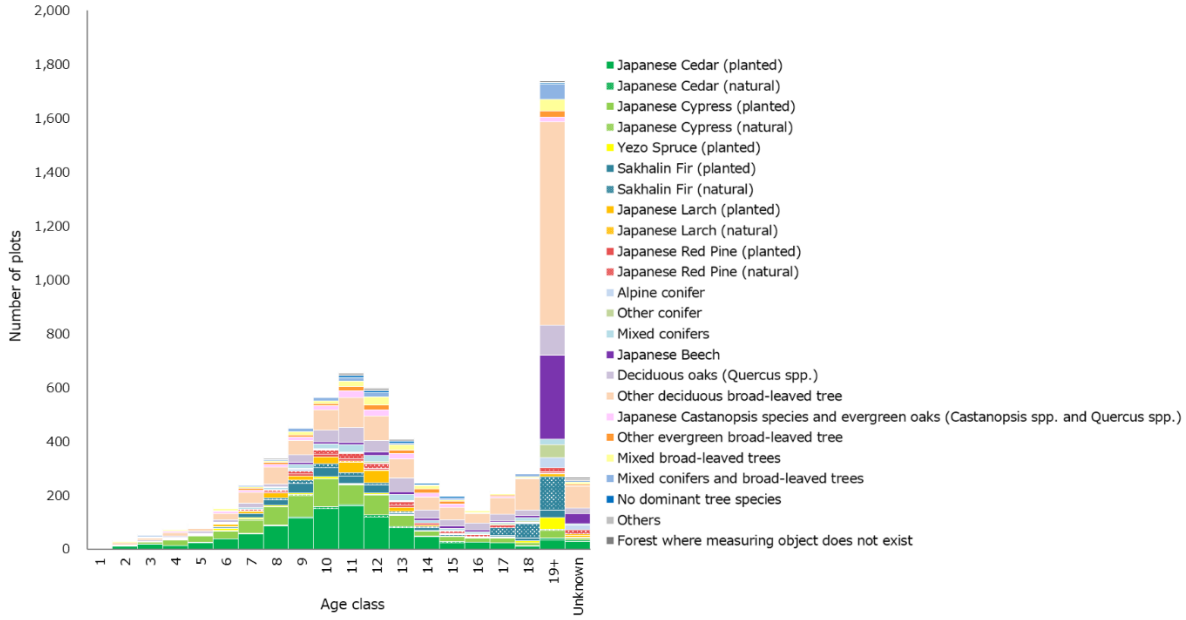


Figure 12: Composition of forest ecosystem types by age class in protected areas
Source: Forest Agency, the 4th National Forest Inventory survey.

1.1.c Fragmentation of forests

Rationale
This indicator provides information on the extent to which forests are being fragmented over time by human activities and natural processes. Fragmentation may lead to the isolation and loss of species and gene pools, degraded habitat quality, and a reduction in the forest's ability to sustain the natural processes necessary to maintain ecosystem health.

Current status and trends
According to the Technical Guidance of the Montréal Process, this indicator is about the extent of fragmentation caused by human-induced activities in particular. The Technical Guidance points to the risk of natural disasters, including forest fires and storm winds, aggravating human-induced forest fragmentation.

Unregulated human-induced forest fragmentation caused by the development of farmlands or roads is not expected to occur in Japan because about 50% of forests are designated as protection forests, where changes to the form and nature of land are regulated. In addition, land development exceeding a certain area requires permission from the prefectural governor in private forests not designed as protection forests.

In general, the state of forest fragmentation can be monitored by dividing the country into grids and calculating the forest ratio of each grid. By changing the grid size, fragmentation can be evaluated at different scales.

A 25-meter-resolution global forest/non-forest map based on an L-band synthetic aperture radar mounted on Advanced Land Observing Satellites Daichi (ALOS) and Daichi-2 (ALOS-2) of Japan is available for download from the Japan Aerospace Exploration Agency (JAXA) website including the data of Japan. Since forests are defined as a form of land use regardless of the presence or absence of trees, they may not necessarily match the results of satellite remote sensing, which visually distinguishes the growth condition of trees at the time of shooting. Since forest/non-forest data are now publicly available, it is hoped that future studies will be conducted to analyze the extent of forest fragmentation in our country and its impact on biodiversity more comprehensively.

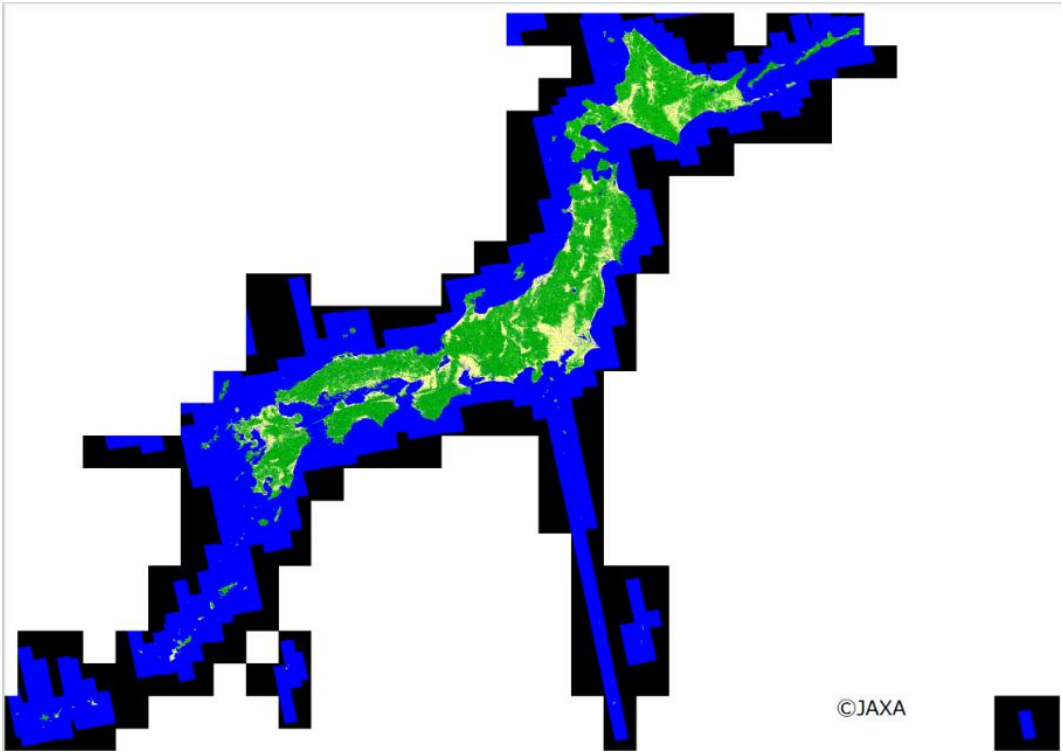


Figure 13: Forest and non-forest map (2020)
Source: Created by Forestry Agency based on JAXA, PALSAR-2 Global Forest/Non-forest Map 2020.

Research results on the impact of forest fragmentation (caused by farmland/housing land development) on the genetic diversity of specific engendered tree species have also been published. As the latest forest fragmentation data will be sequentially available, specific research studies on genetic diversity are expected to increase. It should also be noted that genetic decline due to forest fragmentation is not always detectable, as it requires one or more generations for forest isolation to impact the genetics of the natural population.

1.2 Species diversity

The greatest and most readily recognisable aspect of biological diversity is the variety of species and their population levels. A key objective for the conservation of biological diversity is slowing down the rate of population decline, and species depletion and extinction due to human factors. Changes in species population levels and distribution may also provide an early warning of changes in ecosystem stability and resilience, as will increases in the number of invasive, exotic forest-associated species.

1.2.a Number of native forest associated species

Rationale

This indicator provides information on the health of forest ecosystems through the number of native forest-associated species. Knowledge of the number of native forest-associated species highlights the importance of certain forest types in meeting conservation objectives and in understanding the relationships species have within ecosystems. The loss or addition of species in an ecosystem can provide valuable insights into the overall health and productivity of that system.

Current status and trends

In Japan, there are diverse ecosystems ranging from boreal to subtropical depending on climatic, geographical, and topographical conditions. The 4th National Forest Inventory survey (2014- 2018) identified 2,799 native and 295 exotic vascular plant species (3,094 species in total). This corresponds to approximately 40% of the 8,118 vascular plant species found in Japan are thought to be forest-associated. These species are classified into 1,132 woody, 1,957 herbaceous, and five unclassifiable plants. In planted forests alone, 891 woody species, 1,514 herbaceous species, and three unclassifiable species have been identified. In Japan, planted forests also play an important role as reservoirs for many species for the conservation of biological diversity.

Table 1: Number of vascular plant species in forests in Japan

	Number of vascular plant species		
	Native species	Exotic species	Total
The 4th survey	2,799	295	3,094

(Reference)

	Number of identified species of vascular plant		
	Native species	Exotic species	Total
The 1st survey	3,626	368	3,994
The 2nd survey	3,485	430	3,915
The 3rd survey	2,995	314	3,309

Note: Regarding the understory vegetation, the entire plot (1,000m^2) was surveyed in the 1st and the 2nd surveys, and a portion of the plot (approximately 48m^2) was surveyed in the 3rd and 4th surveys. The number of survey plots was 14,449 in the 1st survey, 14,652 in the 2nd survey, 13,380 in the 3rd survey, and 12,725 in the 4th survey.

Source: Forestry Agency. the 1st to 4th National Forest Inventory surveys.

Regarding animals, 133 species of mammals, 214 species of birds, 74 species of reptiles, and 50 species of amphibians are regarded as forest-associated according to the “Forest Resources Survey Data Analysis Project Report” (Forestry Agency, March 2010). Information on other animal and plant species is currently limited.

Table 2: Number of animal species inhabiting forests in Japan

	Number of known species	Number of native forest species
Mammals	185	133
Birds	417	214
Reptiles	97	74
Amphibians	64	50

Source: Forestry Agency, Report of the Dynamic Change Analysis Project Using Forest Resources Survey Data (March 2010).

1.2.b Number and status of native forest associated species at risk, as determined by legislation or scientific assessment

Rationale
This indicator provides information on the number and status of forest-associated species at risk or in serious decline. As a result, these species may require specific action or intervention to ensure their survival. The number of species at risk and their status is a measure of the health of forest ecosystems and their ability to support species diversity.

Current status and trends
In Japan, the Ministry of the Environment (MOE) assesses the extinction risk of individual wild species inhabiting Japan from a biological perspective and compiles the results as a Red List (a catalog endangered wild species).

Since FY2015, it has been decided to revise the list individually as needed for species requiring reconsideration of the category (rank) due to deterioration of their living conditions, etc. The first to the fifth revised MOE Red Lists were published in 2015, 2017, 2018, 2019, and 2020, respectively. In the 2020 Red List, the categories of 74 species were reviewed. As a result, the number of threatened species increased by 40 from Red List 2019, bringing the total to 3,716. By taxonomic group, the number of amphibians increased by 18 species, and shellfish increased by 13.

Japanese serow (*Capricornis crispus*), a forest-associated native species, is found in Honshu, Shikoku, and Kyushu. In Kyushu and Shikoku, Japanese serow were added to the Threatened Local Population (LP) in the 2012 and 2015 Red List, respectively. The causes cited include aging planted forests and decreasing food resources due to an increase in Japanese deer. The population size of Japanese serow clearly is on a downward trend (the threatened local population is not included in the table below).

The number of Threatened Plant I (vascular plants) species was 1,790 in 2020.

Table 3: Number of endangered species in the MOE Red List (excerpt)

Taxon	Endangered species		Near threatened		Data Deficient	
	2020	2019	2020	2019	2020	2019
Vascular plants	1,790	1,786	297	297	37	37
Bryophytes	240	241	21	21	21	21
Algae	116	116	41	41	40	40
Lichen	63	61	41	41	46	46
Fungi	61	62	21	21	51	50
Mammals	34	33	17	18	5	5
Birds	98	98	22	21	17	17
Reptiles	37	37	17	17	3	4
Amphibians	47	29	19	22	1	1
Brackish/freshwater fish	169	169	35	35	37	37
Insects	367	363	351	350	153	153
Shellfish	629	616	440	445	89	89
Other invertebrate animals	65	65	42	42	44	44
Total	3716	3,676	1,364	1,371	544	544

Sources: MOE, Red List 2019; MOE, Red List 2020.

In the 4th National Forest Inventory survey (2014-2018), 201 species of red-listed vascular plants, including endangered and near-threatened species, were found. One or more endangered or near-threatened species were found in 780 (6%) of the 12,725 survey plots.

Table 4: Number of Red listed vascular plant species

Category		The 1st survey	The 2nd survey	The 3rd survey	The 4th survey
Endangered Species	Endangered Class IA (CR)	43	31	16	11
	Endangered Class IB (EN)	114	74	41	33
	Endangered Class II (VU)	176	169	117	102
	Subtotal	333	274	174	146
Near threatened (NT)		41	84	55	55
Lack of information (DD)		0	0	1	0
Total		374	358	230	201

Note: Regarding the understory vegetation, the entire plot (1,000m$^{2)}$ was surveyed in the 1st and the 2nd surveys, and a portion of the plot (approximately 48m$^{2)}$ was surveyed in the 3rd and 4th surveys. The number of survey plots was 14,449 in the 1st survey, 14,652 in the 2nd survey, 13,380 in the 3rd survey, and 12,725 in the 4th survey.

Source: Forestry Agency. the 1st to 4th National Forest Inventory surveys.

1.2.c Status of on-site and off-site efforts focused on conservation of species diversity

Rationale

This indicator provides information that describes on-site (or in situ) and off-site (or ex situ) efforts to conserve species diversity. Some forest species and habitats may have declined to such an extent that intervention is required to safeguard them for the future.

Current status and trends

In order to conserve biological diversity, protected forests, and Green Corridors are designated in national forests.

The protected forests system, established in 1915, is the pioneer of conservation systems in Japan. The protected forest system aims to contribute to the protection of wildlife, conservation of genetic resources, etc., in primeval natural forests representing Japan's climatic or forest zone, forests with a biocoenosis unique to the region, and forests necessary for the growth and inhabitation of rare wildlife species. In these protected forests, "adaptive management" is promoted to accurately assess changes in the condition of the forest ecosystem through monitoring and other means and to review the management policy and designated areas as needed.

In addition, the Green Corridors aimed at conserving forest ecosystems more widely and effectively by connecting habitats of wild fauna and flora and securing migration networks to encourage interaction among populations. Green Corridors are set up to form networks connecting protected forests.

As of March 2024, the protected forest area is approximately 1.02 million ha, or 4% of Japan's total forest area. The area of Green Corridors is about 0.58 million ha.

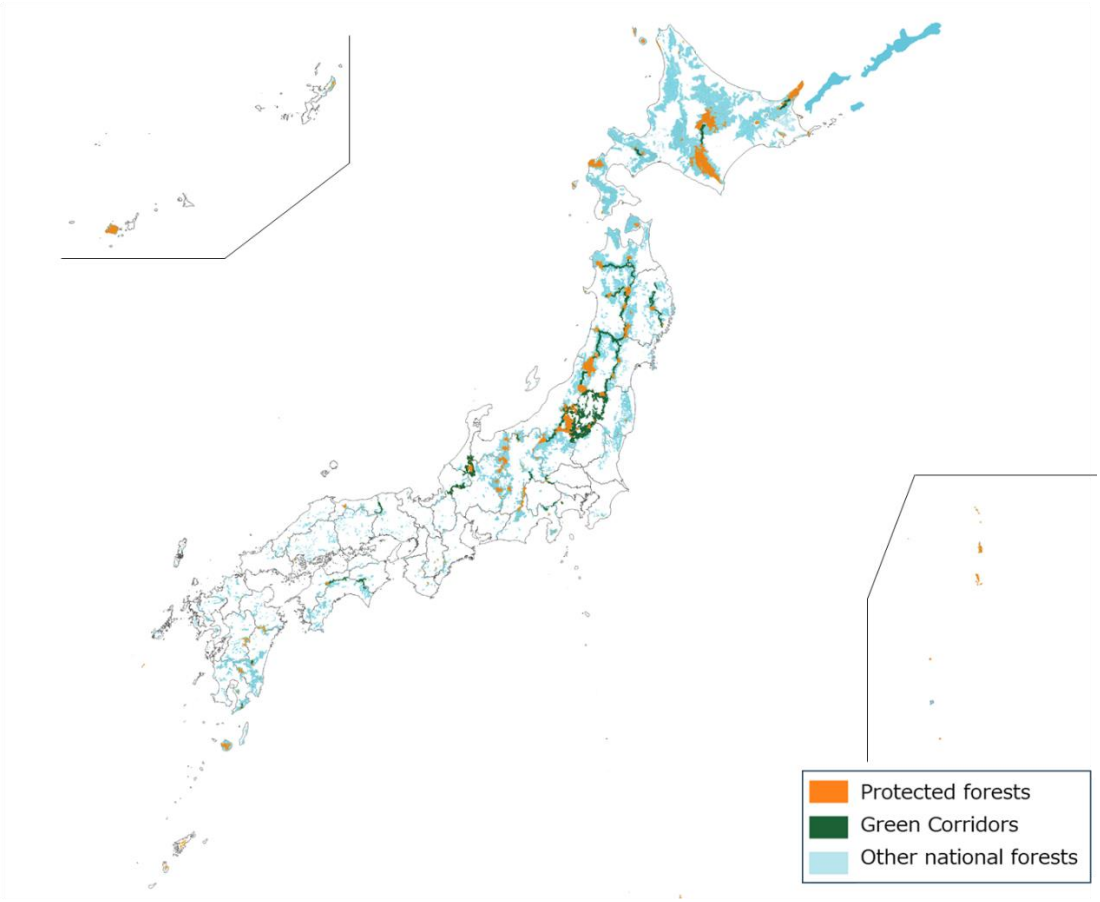


Figure 14: Distribution of protected forests and Green Corridors in national forests

Source: Forestry Agency (April 2024).

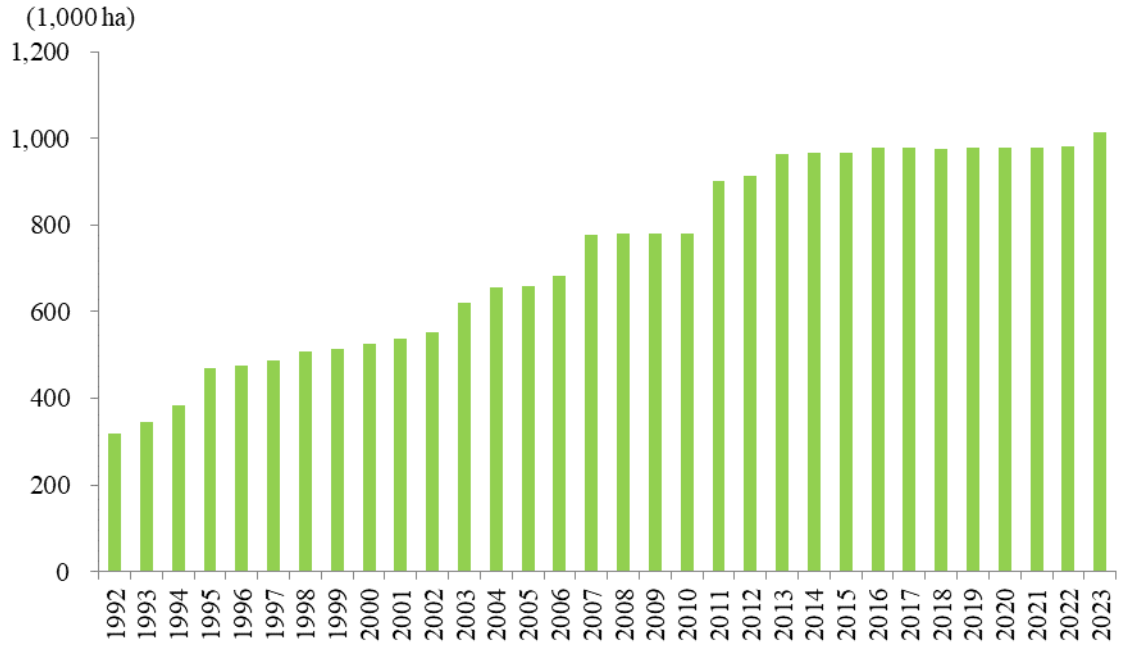


Figure 15: Changes in the area of protected forest in national forests
Source: Forestry Agency, National Forest Management Statistics.

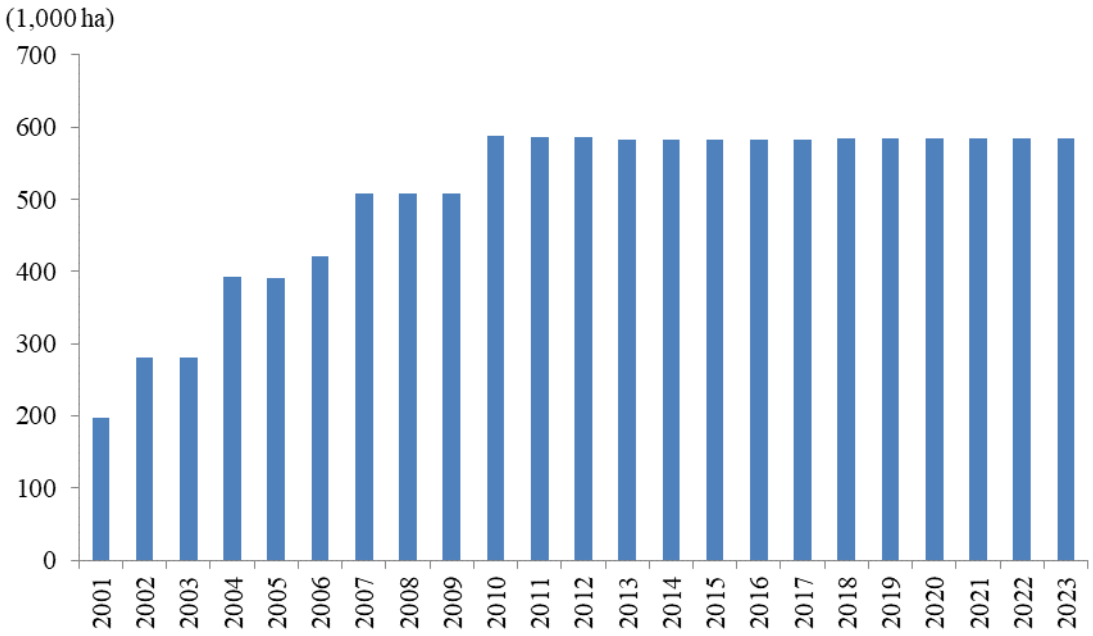


Figure 16: Changes in the area of Green Corridors in national forests
Source: Forestry Agency, National Forest Management Statistics.

In addition to the above, based on the provisions of the Act on Conservation of Endangered Species of Wild Fauna and Flora, when the survival of populations of a species designated as a nationally endangered species is difficult just by regulating capture, collection, etc., it is necessary to conserve their habitats as Natural Habitat Protection Areas. As of July 2021, 10 sites, 1,489 ha in total, are designated as Natural Habitat Protection Areas, which include ecosystems where forest is a major component.

About half of the 3.52 million ha of wildlife protection areas designated from the viewpoint of protecting wildlife are forest wildlife habitats. Hunting is prohibited in Wildlife protection areas.

Table 5: Number and area of Wildlife protection areas

Wildlife protection areas		Forested wildlife habitats	
Number of sites	Area (ha)	Number of sites	Area (ha)
3,735	3,519,555	1,911	1,715,514

Source: MOE's website, Status of designation of wildlife protection areas (FY2020).

In addition, the national government certified 253 "the Nationally Certified Sustainably Managed Natural Sites," which are areas where biodiversity conservation is being promoted through the activities of the private sector and others. Of these, 184 sites certified in 2023 have been registered in the international database as OECMs (Other Effective area-based Conservation Measures: areas other than protected areas that contribute to biodiversity conservation), excluding areas that overlap with protected areas.

1.3 Genetic diversity

Genetic diversity, or the variation of genes within populations and species, is the ultimate source of Biological Diversity at all levels and is important for the functioning of healthy forest ecosystems. Threats to gene pools come from climate change, catastrophic events, and human activities and pressures.

Loss of genetic variation reduces the ability of species to adapt to environmental change and for society to maximize the potential benefits available from forest species, for example for medicines and other bio-resources. High levels of genetic diversity within populations are usually a measure of their greater potential for survival. The loss of genetic variation within species also makes forest ecosystems less resilient to change.

1.3.a Number and geographic distribution of forest associated species at risk of losing genetic variation and locally adapted genotypes

Rationale

This indicator provides information on the number and distribution of forest-associated species at risk of losing genetic variation across their population. This erosion in genetic variation makes species less able to adapt to environmental change and more vulnerable to extinction. Some local populations with unique gene pools may also risk being swamped by larger populations introduced intentionally, by accident, or by natural processes.

Current status and trends

The genetic structures of organisms greatly vary, even within the same species, depending on the region. In Japan, research has been conducted on regional genetic variations of some widely distributed tree species. The analysis of the appearance of saplings of the species in the observation points, based on the results of the National Forest Inventory, is expected to contribute to the understanding of the geographical distribution of the tree species in peril of losing genetic diversity and genotypes.

Selecting Japanese beech from among the tree species whose geographical gene structure has been elucidated, the sustainability of the species, regional genetic types, and diversity were analyzed based on the basic genetic data and the change in occurrence of saplings found by the National Forest Inventory. The results are as follows.

It has been clarified that the gene structures of Japanese beech along the Sea of Japan and those found between Kanto and the Kii Peninsula and in Shikoku/Kyushu differ. The changes in of sapling occurrence from the 1st to the 4th National Forest Inventory surveys were studied, classified in the table below, and mapped in Figure 17.

Table 6: Classification of changes in the appearance of saplings

Category	Description
Saplings Present	Plots where saplings were continuously found in the 1st to 4th surveys.
Saplings Increased	Plots where saplings were not found in the 1st, 2nd or 3rd surveys but found in the 4th survey.
Saplings Decreased	Plots where saplings were found in the 1st, 2nd or 3rd surveys but not found in the 4th survey.
Saplings were Not found	Plots where saplings were not found from the 1st to 4th surveys.

There was a large number of plots where saplings were “present” and “increased” on the Sea of Japan side of eastern Japan, but almost none in the region from Kanto to western Japan. This analysis shows that saplings were not found consistently in the Kanto to Kii Peninsula, Shikoku, and Kyushu regions, where the genetic structure is different from other regions. This suggests the possibility of poor regeneration in this area. The population in western Japan is known to have a high genetic diversity and has been increasingly isolated, and the poor regeneration indicates that these regions require particular attention for sustainability.

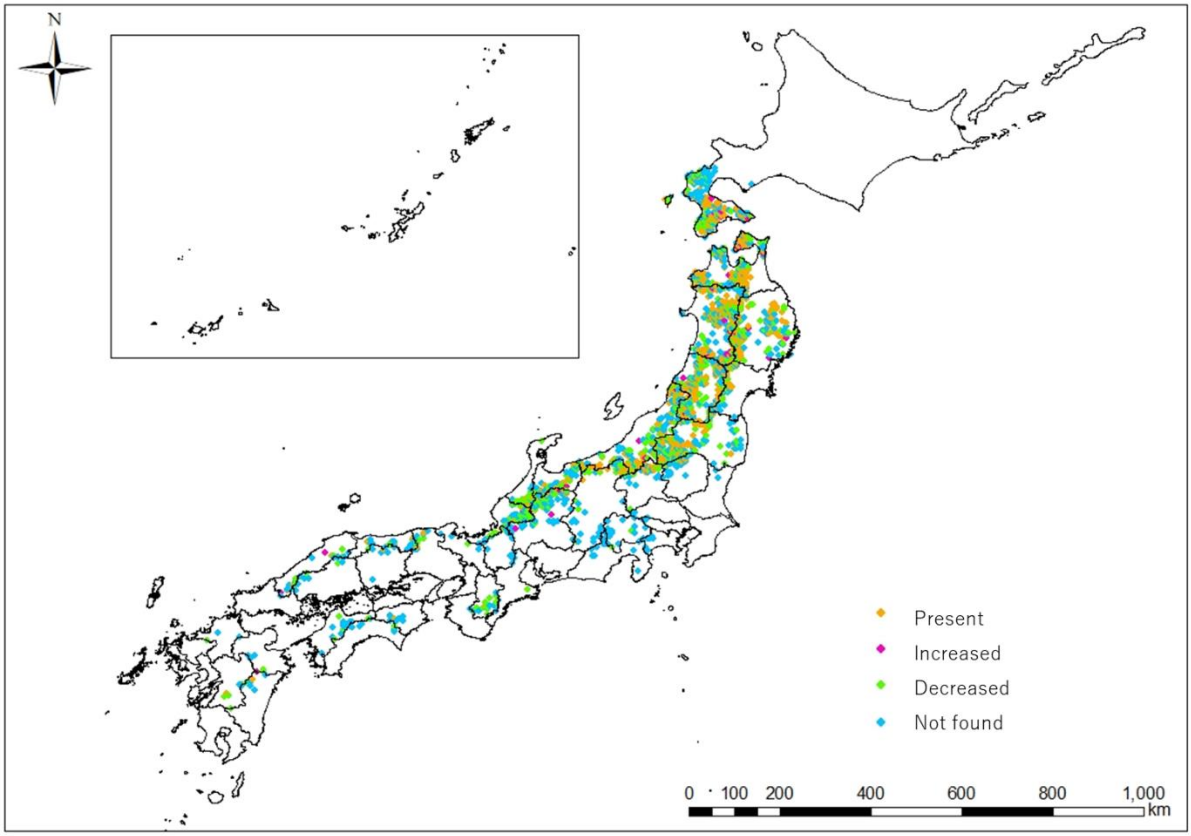


Figure 17: Japanese Beech distribution and occurrence of saplings
Source: Forest Agency, the 4th National Forest Inventory survey.

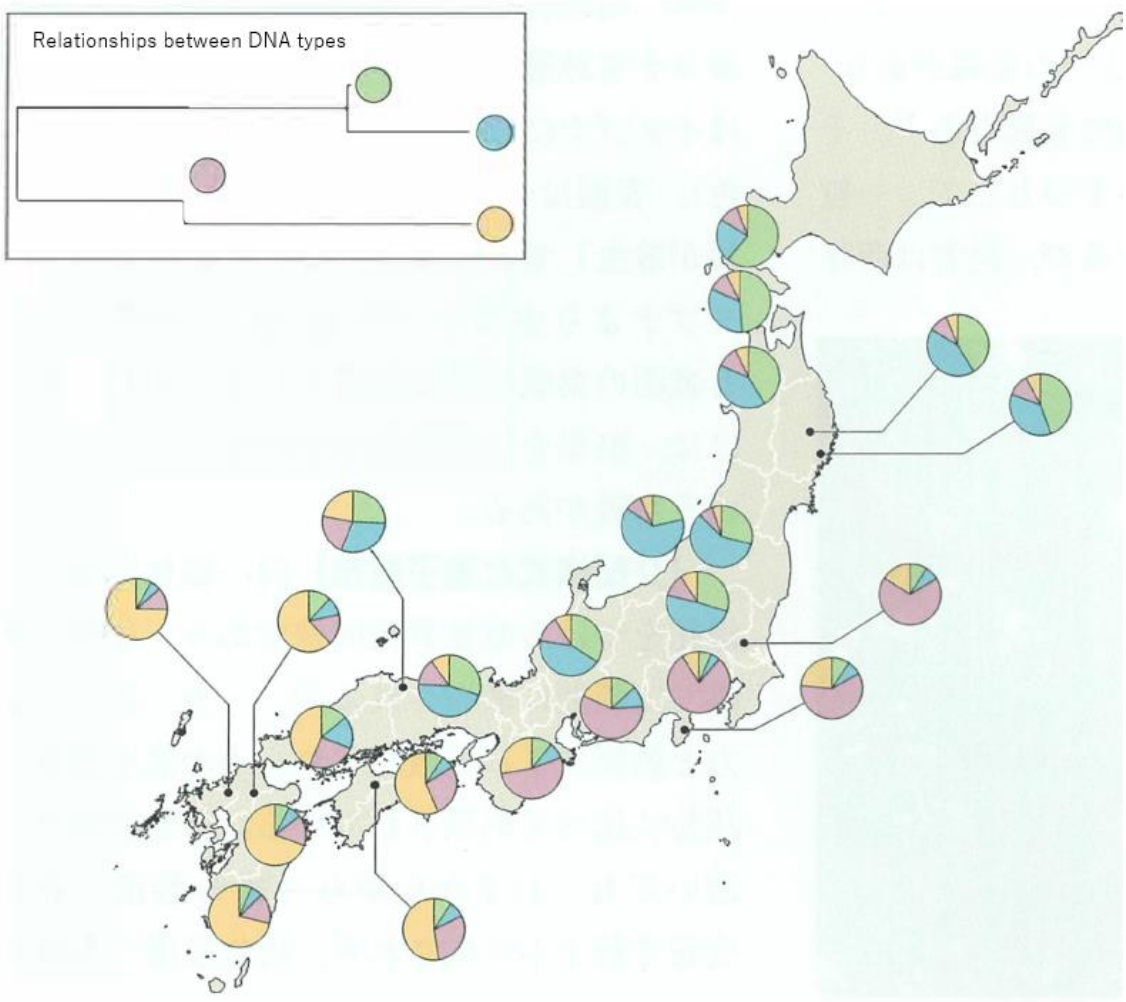


Figure 18: Genetic population structure based on nuclear DNA analysis of Japanese Beech
Source: Tsumura and Suyama (2015).

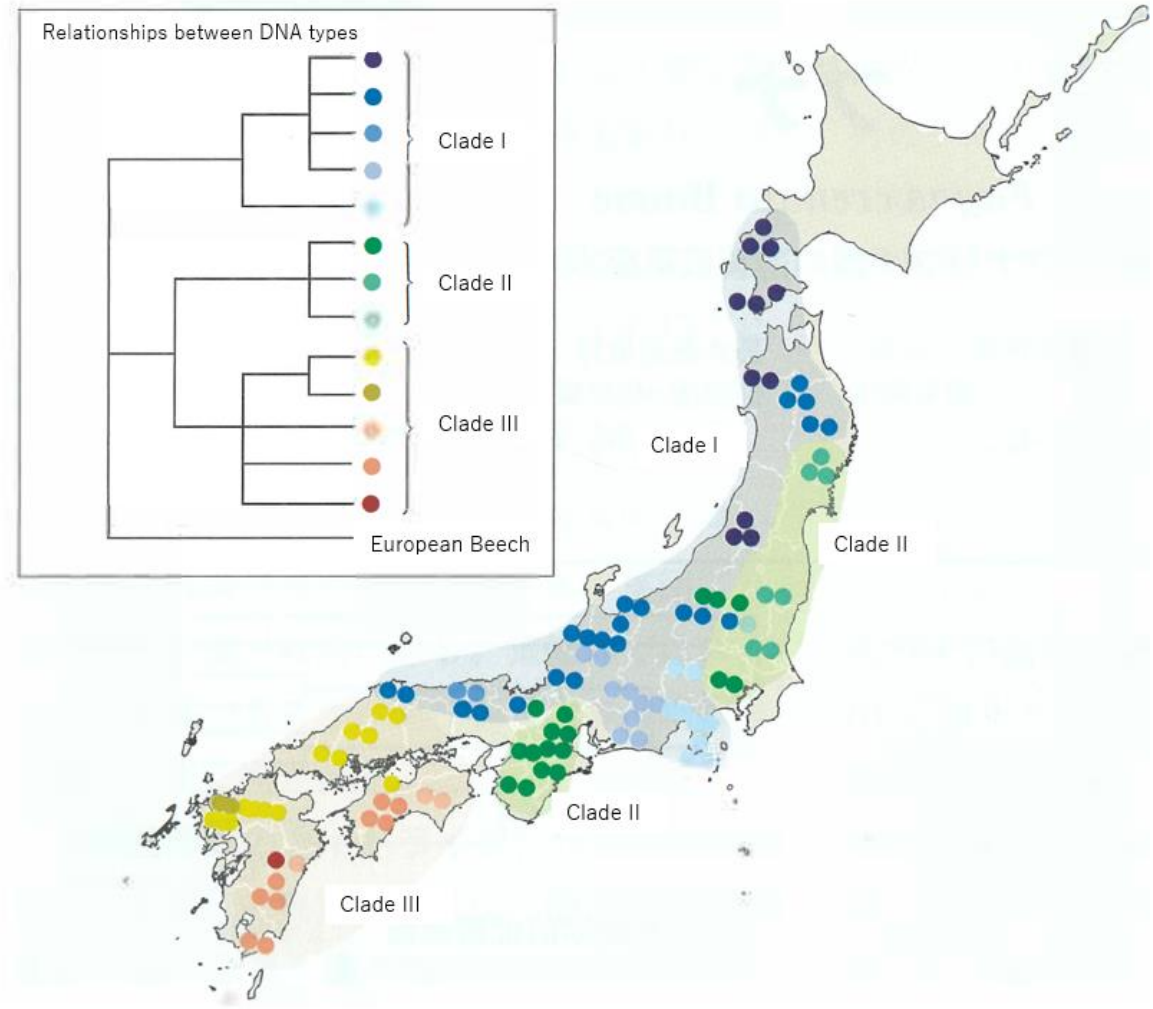


Figure 19: Genetic population structure based on chloroplast DNA analysis of Japanese Beech
Source: Tsumura and Suyama (2015).

1.3.b Population levels of selected representative forest associated species to describe genetic diversity

Rationale
This indicator provides information on the population status of selected forest-associated species that are considered to reflect the genetic diversity present in forest ecosystems. Some forest species support or rely heavily on particular forest structures, patterns, associations and processes and can therefore be used to describe the status of genetic diversity in forests as a whole.

Current status and trends
There is not enough information to identify the representative forest species reflecting the genetic diversity in forest ecosystems in Japan. As described in Indicator 1.3.a, studies have been conducted on the genetic diversity of some tree species in forests.

1.3.c Status of on-site and off-site efforts focused on conservation of genetic diversity

Rationale

This indicator provides information that describes on site (or in situ) and off-site (or ex situ) efforts to conserve genetic diversity within species. Some species have suffered from a loss of genetic variability due to population decline and a reduction in their former range and distribution. Continued loss of genetic variability will threaten the viability of these species and may accelerate a decline that may lead ultimately to extinction.

Current status and trends

The protected forest, the Green Corridor in the national forest, and other systems described in 1.2.c play an important role in conserving genetic diversity, as they do at the species level. The areas of forest bio-genetic resources preservation forests and forest tree-genetic resources preservation forests were reported up to the 2nd national report (2009). As a result of the reorganization of the protected forest system from 2015 to 2018, these forests have been reorganized into three categories of protected forests. All three of the new protected forest categories are protected and managed to contribute to the conservation of biological diversity, including intraspecific (genetic) diversity.

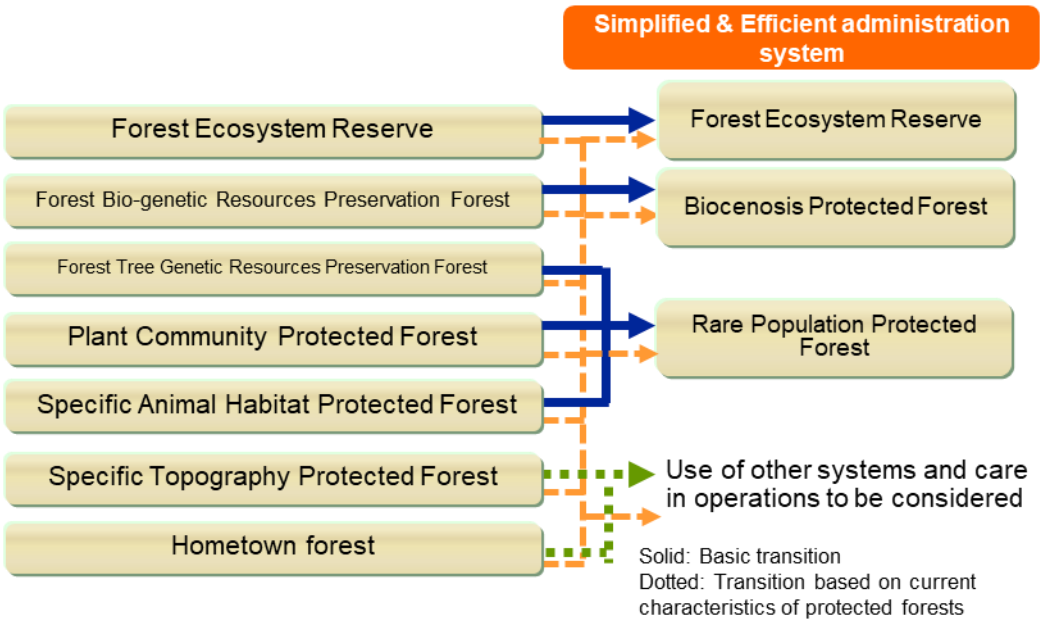


Figure 20: Reorganization of protected forest categories

Source: Forestry Agency.

The Green Corridors mentioned in 1.2.c aim to conserve forest ecosystems more widely and effectively by connecting the habitats of wild fauna and flora and securing migration pathways to encourage interaction among populations. The Green Corridors are set up to form networks connecting protected forests.

As of March 2024, the area of protected forests is approximately 1.02 million ha, or 4% of Japan's total forest area. The area of Green Corridors is approximately 0.58 million ha.

To conserve the genetic diversity of forest tree species, the FTBC has been conserving/preserving forest tree genetic resources in various ways described below considering the purpose of storage. These include securing species diversity and intraspecific genetic diversity, local regeneration status of genetic resources, and utilization of genetic resources.

- *Ex-situ* conservation/preservation: Approximately 30,000 adult tree individuals in the premises of the FTBC, etc., approximately 16,000 specimens of seeds, pollen, or DNA in a storage facility (as of the end of FY2020).
- 931 ha of 234 preservation stands (planted forests) established for the preservation of superior gene

cluster (as of the end of FY2020).

- *In-situ* conservation/preservation: 736, 000 ha of 31 forest ecosystem reserves, 239,000 ha of 97 biocenosis-protected forests, and 40,000 ha of 530 rare population protected forests are preserved (as of April 2024).

The FFPRI has been exploring, collecting, assessing, storing, and distributing genetic resources of microorganisms related to forests and forestry, including tree-pathogenic microbes, wood-rotting fungi, mycorrhizal fungi, and insect-pathogenic microbes. Researchers identify collected microorganism resources specialized in the respective fields and investigate their characteristics. After confirmation of their proliferation, identified strains are stored and maintained in a stable condition and distributed to research institutes and other organizations that use them for test research or education on mushrooms.

Criterion 2: Maintenance of productive capacity of forest ecosystems

Many communities depend on forests directly or indirectly for a wide range of forest- based goods and services. The sustainable provision of these services is clearly linked to the productive capacity of the forest. If this capacity is exceeded there is the risk of ecosystem decline and collapse.

For forests to be sustainable it is necessary to understand the levels at which goods and services may be extracted or used without undermining the functioning of forest ecosystems and processes. The nature of goods and services provided by forests change over time due to social and economic trends, and technological developments. Change in the productive capacity of forests may be a signal of unsound forest management practices or other agents that are affecting forest ecosystems in some way.

2.a Area and percent of forest land and net area of forest land available for wood production

Rationale

This indicator measures the availability of forest land for wood production compared with the total forest area of a country. It provides information that will help assess the capacity of forests to produce wood to meet society's needs.

Current situation and trends

In Japan, forests in which logging is prohibited in principle by laws and regulations are as follows: some categories of protection forests designated under the Forest Act, forests located within special protection zones of natural parks designated under the Natural Parks Act, natural wilderness conservation areas designated under the Nature Conservation Act and special mother tree stands designated under the Forestry Seeds and Seedlings Act. These forests account for about 3% of the total forest area. Regarding protection forests, the Forest Act establishes methods and restrictions for felling trees. It prohibits logging in protection forests at high risk of causing damage from various forms of landslides, and avalanches - approximately 0.34 million ha of such protection forests (as of the end of March 2018).

Forests other than the aforementioned protected forests are allowed to produce timber under certain rules and guidelines to secure the fulfillment of their multiple functions. These forests also have restrictions on the felling of standing trees by laws and regulations including soil erosion control areas and special protection zones in the wildlife protection area. In those forests, prior permission from administrative agencies before felling is required. In private forests other than the aforementioned forests, prior notification to the municipality's mayor is required for logging in accordance with the Forest Act.

Table 7: Areas of forests that are prohibited from felling in principle (FY2022)

Category	Area (ha)
Protection forests (prohibited from felling)	338,283
Special protection zones of natural parks	336,483
Natural wilderness conservation areas	5,631
Special mother tree stands	1,113

Source: Forestry Agency.

2.b Total growing stock and annual increment of both merchantable and non-merchantable tree species in forests available for wood production

Rationale:
This indicator measures the growing stock and annual increment of forest area available for wood production to meet society's needs. The annual increment and growing stock can be related to the volume harvested each year to provide a means to demonstrate the sustainable management of forest resources.

Current Status and Trends
Japan's total growing stock has increased three-fold, from 1.89 billion to 5.56 billion m^3, in the past half-century period from 1966 to 2022. Since 1990 the stock has been increasing at an annual average of about 80 million m^3. The increase of the growing stock of planted forest is particularly remarkable. It increased 6.4-fold, from 558 million m^3 in 1966 to 3,545 million m^3 in 2022, and their share of the total growing stock also increased from 30% to 64% during the same period.

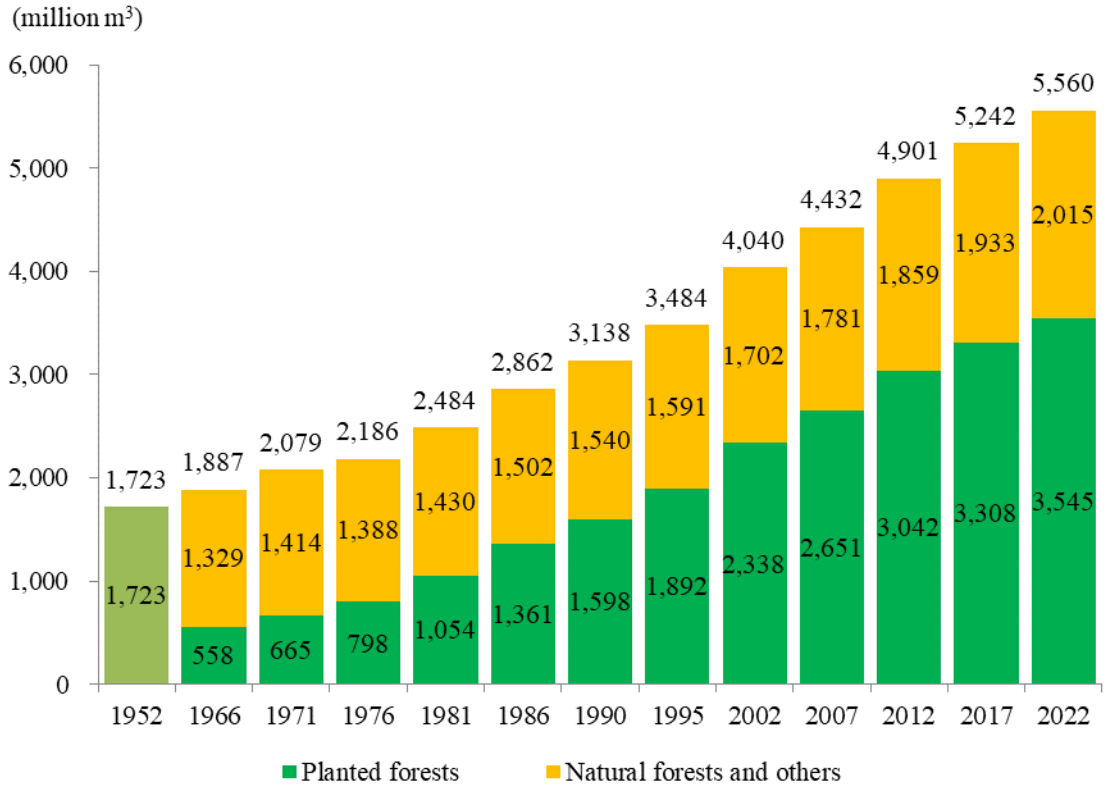


Figure 21: Changes in the total growing stock of forests in Japan
Note: The data for 1952 is as of March 1, 1952; for 1966, it is as of the end of FY1966; for 1971, it is as of April 1, 1971; and for 1976 and later, it is as of March 31 each year.
Source: MAFF, Statistics Charts (1952 only); Forestry Agency, State of Forest Resources.

As regards the composition of species in the growing stock of planted forests, the most common species is Japanese cedar (*Cryptomeria japonica*), followed by Japanese cypress (*Chamaecyparis obtusa*). They are indigenous afforestation species that have long been used for planting and are also widely used for commercial purposes, including building materials, because of their excellent properties, ease of processing, and relatively fast growth.

The growing stock of natural forests, mostly consisting of broad-leaved trees, is also increasing with the progress of their succession as fuelwood forests around communities are no longer used.

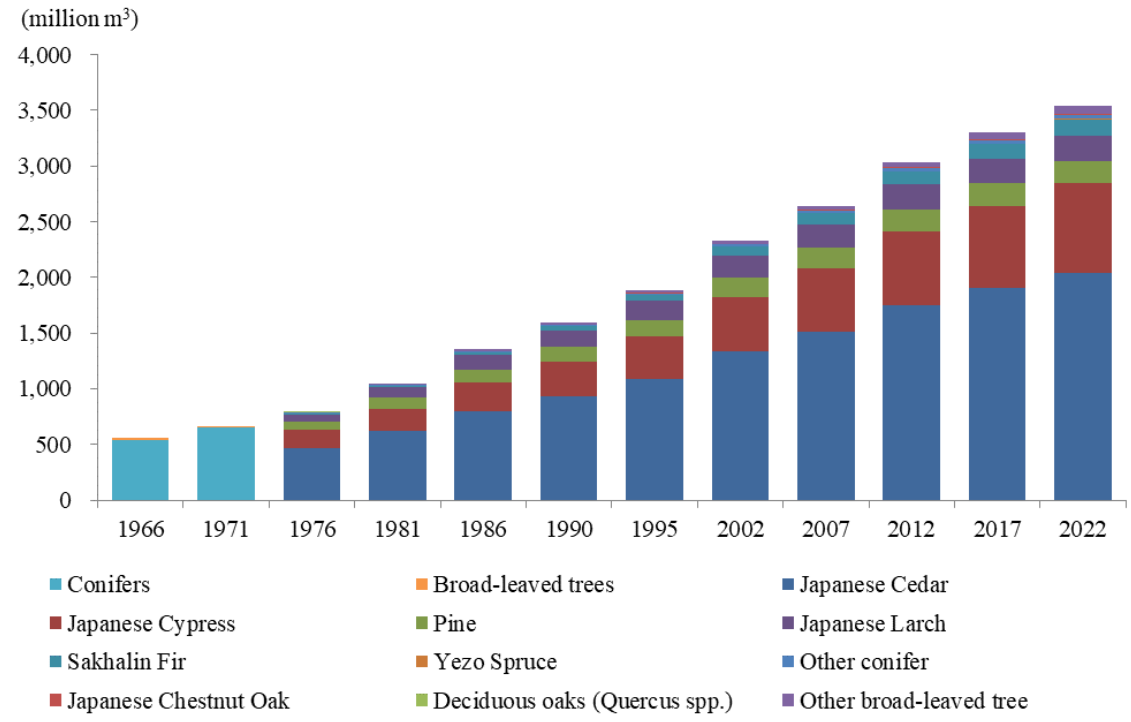


Figure 22: Changes in the growing stock of planted forests
Source: Forestry Agency, State of Forest Resources.

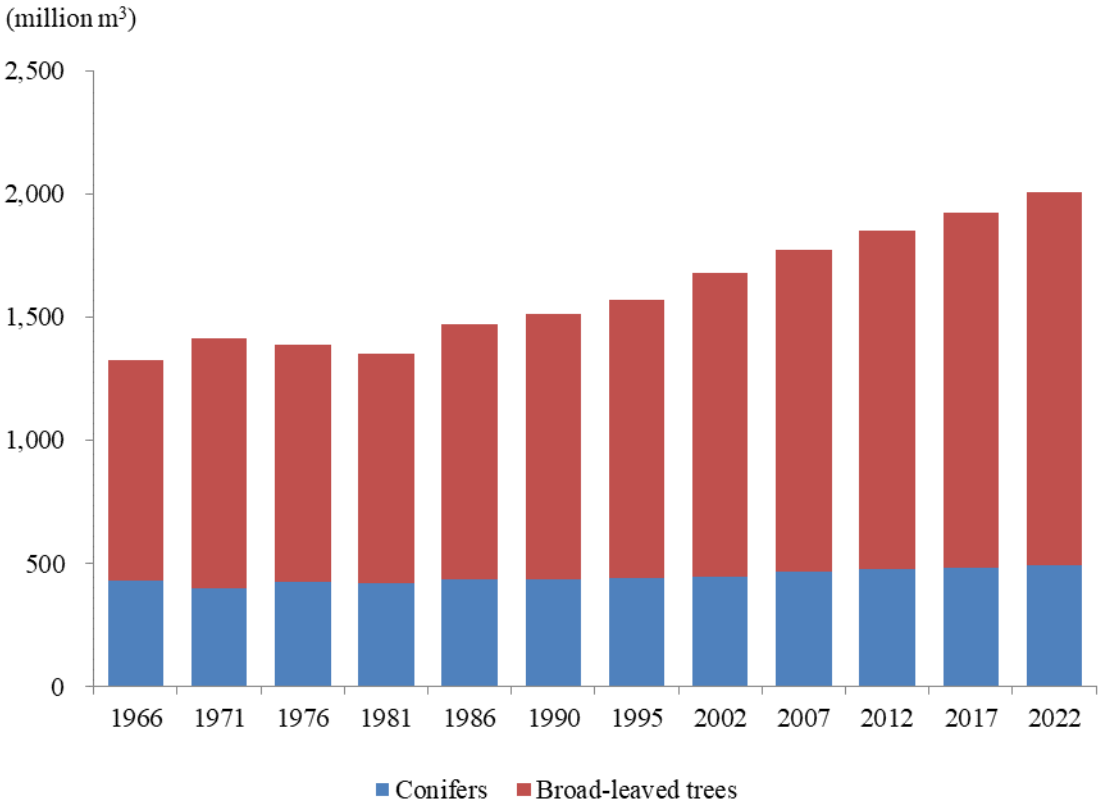


Figure 23: Changes in the growing stock of natural forests
Source: Forestry Agency, State of Forest Resources.

2.c Area, percent, and growing stock of plantations of native and exotic species

Rationale

This indicator provides information on the nature and extent of plantation forests. Changes in the area of plantation reflect society's present and future needs or the impact of competing land uses on forest cover. The use of both native and exotic plantation species may enhance the range and quantity of goods and services available.

Current status and trends

Planted forests cover approximately 10.09 million ha in Japan, accounting for 40% of its total forest area. Regarding the species, Japanese cedar (*Cryptomeria japonica*) holds the highest percentage, occupying 44%, and is followed by Japanese cypress (*Chamaecyparis obtusa*) and Larch (*Larix kaempferi*), occupying 25% and 10%, respectively. The major planting species in Japan are all native.

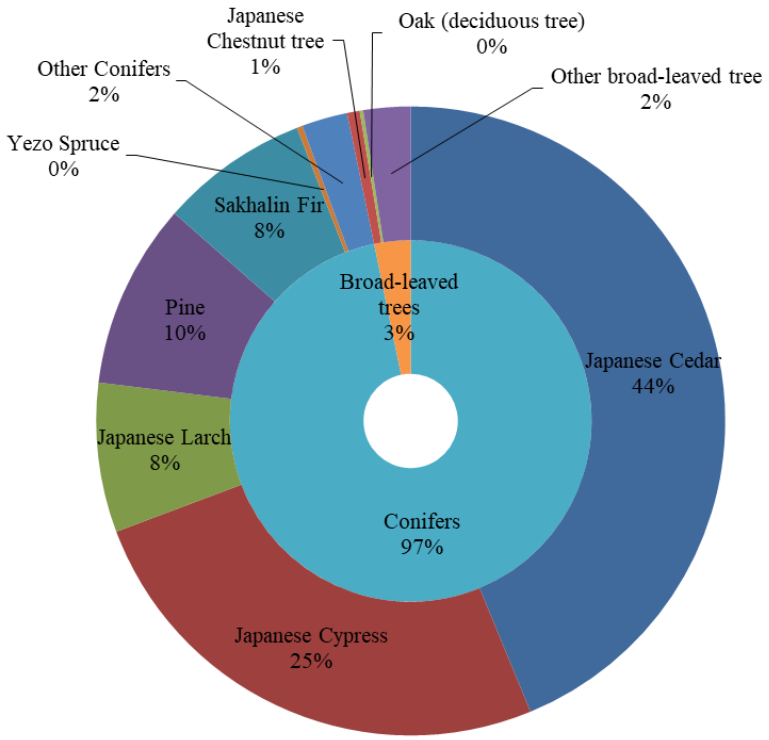


Figure 24: Composition of species in the area of planted forests

Source: Forestry Agency, State of Forest Resources (2022).

According to the 4thNational Forest Inventory (2014-2018), among planted forests, 1.55% of the plots are dominated by exotic species, including conifers such as strobe pine (*Pinus strobus*), Dahurian larch (*Larix gmelinii*), and Norway spruce (*Picea abies*), broad-leaved trees such as black locust (*Robinia pseudoacacia*) and lacquer tree (*Toxicodendron vernicifluum*), and bamboos, such as thick-stemmed bamboo (*Phyllostachys edulis*), giant timber bamboo (*Phyllostachys bambusoides*) and henon bamboo (*Phyllostachys nigra var. henonis*).

In 2022, the growing stock of planted forests was approximately 3,545 million m^3, accounting for approximately 64% of the total growing stock of the forests in Japan. Japanese cedar, Japanese cypress and larch accounted for 57%, 23%, and 6% of such growing stock, respectively.

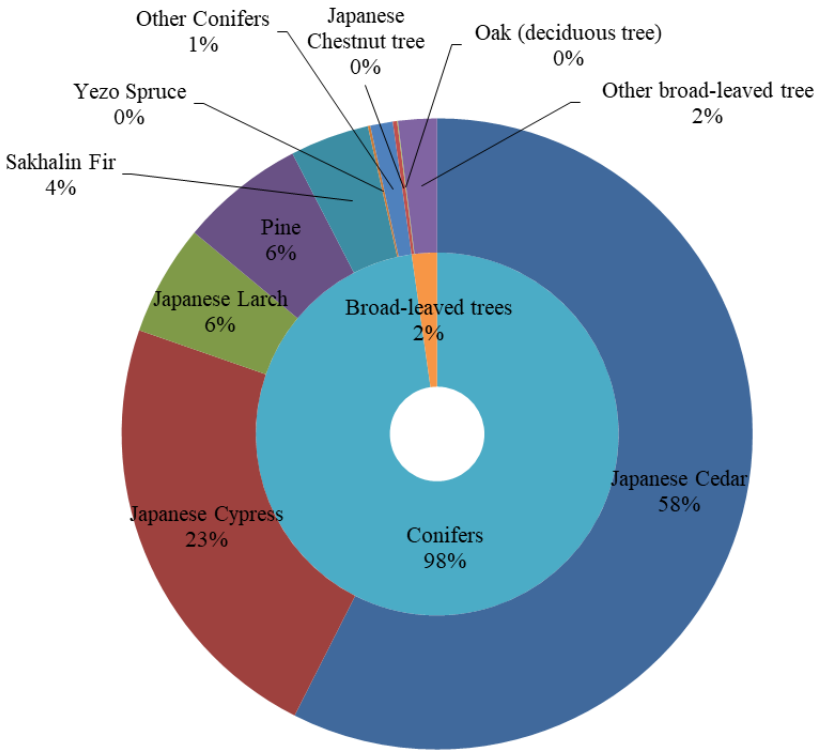


Figure 25: Composition of species in growing stock of planted forests
Source: Forestry Agency, State of Forest Resources (2022).

Most of the planted forests of Japan were established during the late 1950s through the early 1970s when wood demands for construction and pulp increased due to the rapidly growing economy. Nowadays, about 60% of such forests have reached an age higher than age class 10, a stage at which they can be used as resources.

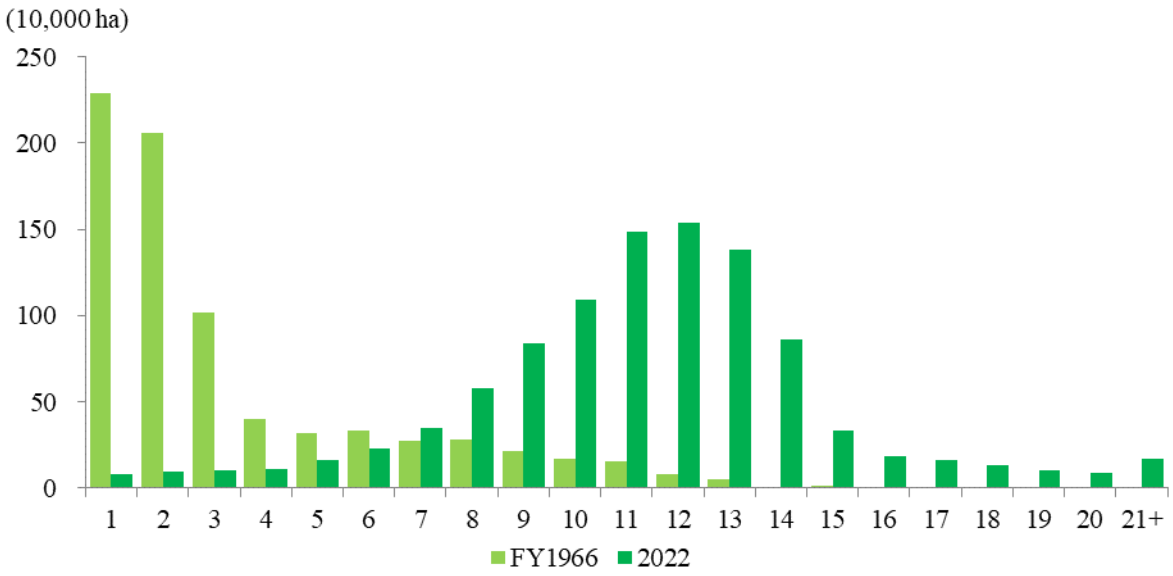


Figure 26: Changes in composition of age class of planted forests
Source: Forestry Agency, Forest Resources in Japan (FY1966); Forestry Agency, State of Forest Resources (2022).

New movement is emerging in the development of reforestation techniques. Until recent years, domestic hardwoods such as Mongolian oak (*Quercus mongolica var. mongolica*) with high wear resistance have been partly used for furniture etc. but most of the raw materials come from imported wood. Besides hardwood imports have decreased in recent years, domestic hardwood resource uses have increased, and there has been a movement to use domestic hardwood. In this context, a technical guide was published to promote forest management techniques for fast-growing tree species such as Sendan (*Melia azedarach*), which can be used for industrial wood and contribute to reducing silvicultural costs.

In addition, Koyozan (*Cunninghamia lanceolata*), a conifer native to China, is a wood that can be used for construction materials. It is also said to grow fast, so in some areas, it is used as a plantation species to reduce reforestation costs.

2.d Annual harvest of wood products by volume and as a percentage of net growth or sustained yield

Rationale:
This indicator compares actual harvest levels against what is deemed to be sustainable. The purpose is to assess whether forests are being harvested beyond their ability to renew themselves or are being under-utilised for wood products.

Current situation and trends
In the past 30 years, forest growing stock has increased by about 60 to 80 million m^3 annually. The change in growing stock is obtained by subtracting the harvest and loss through natural processes from the net growth of forests. An increasing trend means that the harvest is well below the range of the net growth of forests. Therefore, the level of forest harvest is within a sustainable range.

The volume of harvested standing trees had continued to decline at an annual average of 30 to 40 million m^3 for some time. From 2007 to 2011, the average annual volume increased to around 43 million m^3; from 2017 to 2021, the average annual volume was around 49 million m^3.

This can be partly attributed to the fact that the target of thinning 3.3 million ha over the six years from FY2007 to FY2012 was set to ensure carbon absorption by the forest, as stated in the Kyoto Protocol Target Achievement Plan. Efforts were made to implement this target steadily. It is also thought to have affected the increased harvesting of planted forests as they have reached the general harvesting age.

The progress of technology development may have provided an additional boost. For example, small-diameter coniferous logs produced by thinning became usable as plywood material in the first half of the 2000s. As mentioned in Indicator 2.c, Japan's planted forests as a resource have matured. To establish a cyclic utilization system of forest resources of harvesting, using, planting, and nurturing, the promotion of regeneration cutting is also expected.

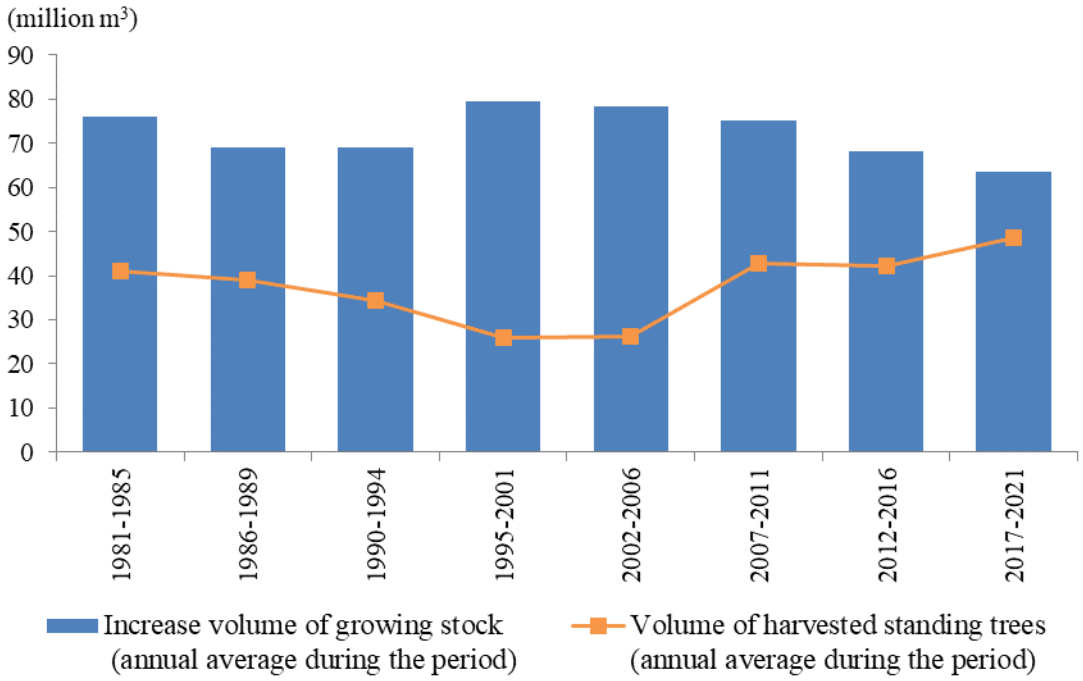


Figure 27: Changes in average annual increase volume of growing stock and harvested volume
Source: Forest Agency, State of Forest Resources; Forestry Agency, Forest and Forestry Statistics Handbook.

2.e Annual harvest of non-wood forest products

Rationale:
This indicator reports on the sustainability of the harvest of non- wood forest products. The wellbeing of indigenous and other communities dependent on non-wood forest products may be closely allied to the forest's ability to maintain its productive capacity over time.

Current status and trends
In Japan, most non-wood forest products (NWFPs) (In this report, NWFPs are defined as products originating from forests, excluding commonly used wood and wood products.) are classified as non-timber forest products (NTFPs). It includes mushrooms such as shiitake, enokitake, and bunashimeji mushrooms, tree fruits, wild vegetables, raw materials for crafts such as Japanese lacquer and Japan wax, bamboo, paulownia wood, charcoal, and essential oils derived from forests. The production and sales of these products are one of the industries using local resources of farming and rural mountain communities and have been fulfilling a major role in ensuring the stability of the regional economy and securing job opportunities.

Edible mushrooms are major products that account for about 90% of edible NTFPs in volume. The largest production is bunashimeji and enokitake mushrooms, each 118,000 tons (2023). These data are on cultivated mushrooms artificially grown in facilities outside the forest in recent years. The yield of wild mushrooms, that are mainly for domestic consumption, is unknown.

In Japan, more than 1,000 kinds of edible wild plants grow, and some of them are processed and eaten as preserved food. Representative kinds are young shoots of certain ferns, such as bracken fern and Asian royal fern, and young sprouts of trees, such as Japanese angelica trees.

In addition, the production of charcoal, firewood, bamboo, and Japanese lacquer, which are non-edible NTFPs, has been generally flat over the past 10 years.

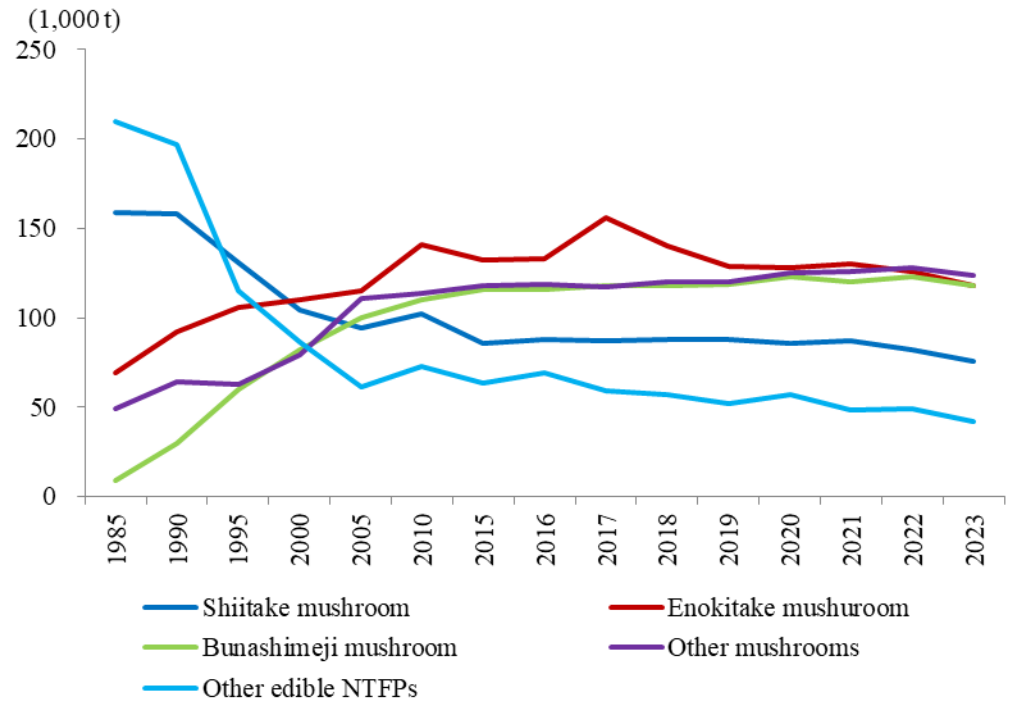


Figure 28: Changes in volume of production of edible NTFPs
Source: MAFF, Non-timber Forest Products Data.

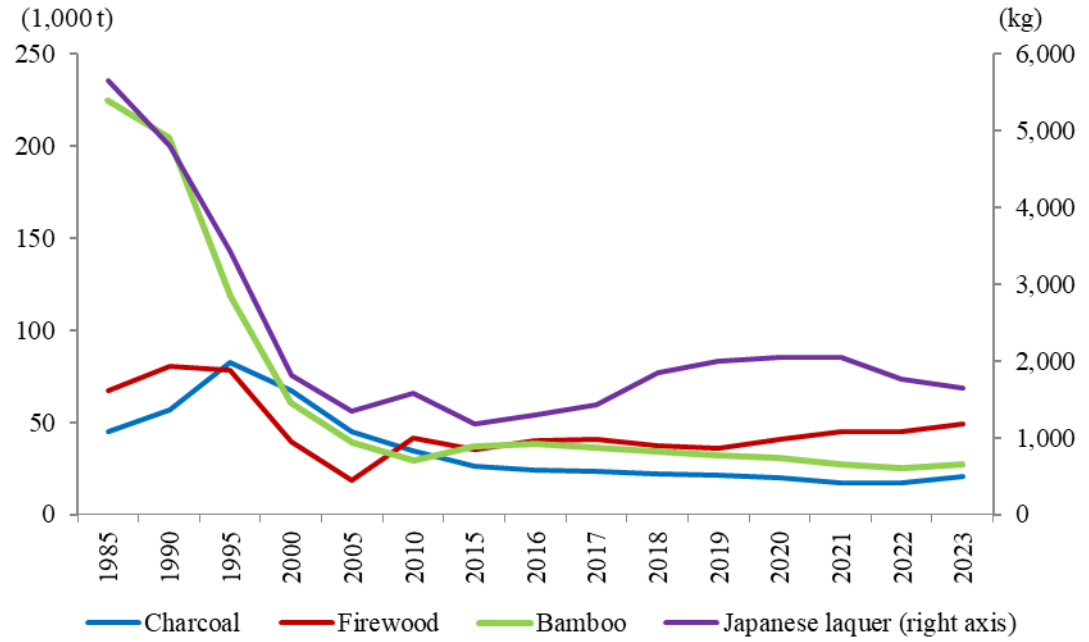


Figure 29: Changes in volume of production of charcoal, firewood, bamboo, and Japanese lacquer
Note: Charcoal includes white, black, dust, bamboo, and oga charcoal.
Source: MAFF, Non-timber Forest Products Data.

Crop damage caused by wildlife, including sika deer, wild boars, and Japanese monkeys, has become a serious problem. The damage reached 15.6 billion yen in 2022. As a result of the promotion of countermeasures, the number of captured wildlife has been increasing yearly. In response, efforts to use captured wildlife as local resources, such as game meat, are spreading to many regions. The Ministry of Agriculture, Forestry and Fisheries (MAFF), in cooperation with the Ministry of Health, Labor and Welfare (MHLW), is working to ensure the safety of game meat as food while at the same time supporting efforts to develop meat processing facilities for captured wildlife, develop game-meat products based on consumer needs, and establish distribution and marketing channels. In the distribution of wild game, the MAFF operates a certification system (established in May 2018) for meat processing facilities that comply with hygiene management and distribution standards and ensure traceability through appropriate labeling to provide safer wild game products and ensure consumers' confidence in wild game products.

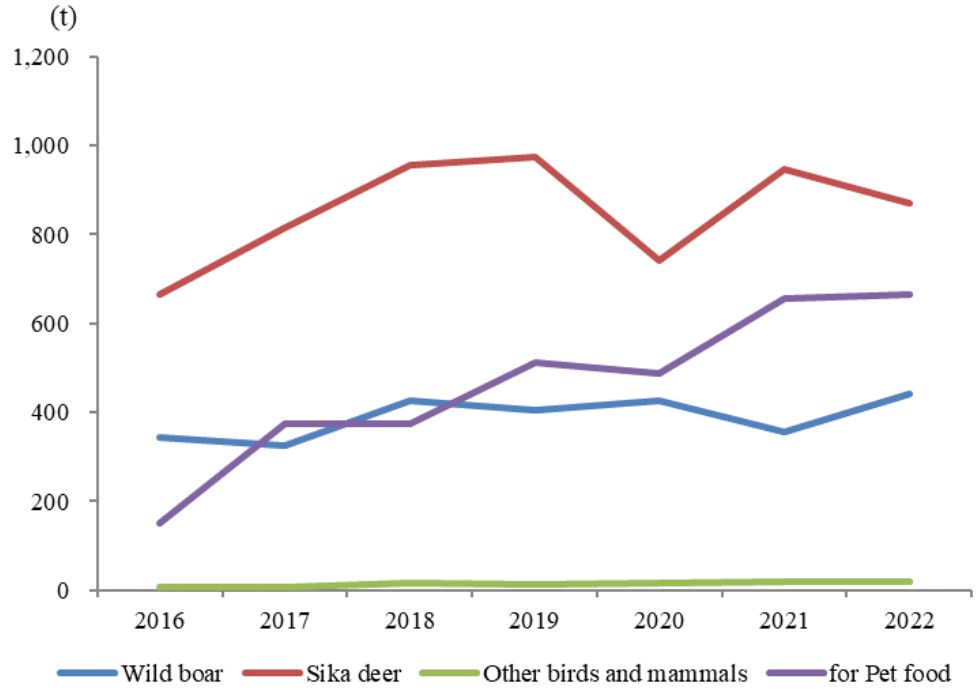


Figure 30 Changes in game meat sales of wild birds and mammals resources
Source: MAFF, Survey on the State of Utilization of Wildlife Resources.

Criterion 3: Maintenance of forest ecosystem health and vitality

The maintenance of forest health and vitality is dependent upon the ability of the ecosystem's functions and processes to recover from or adapt to disturbances. While many disturbance and stress events are natural components of forest ecosystems, some may overwhelm ecosystem functions, fundamentally altering their patterns and processes and reducing ecological function.

Decline in forest ecosystem health and vitality may have significant economic and ecological consequences for society including a loss of forest benefits and the degradation of environmental quality.

Information gained on the impacts of biotic and abiotic processes and agents may inform management strategies to minimise and mitigate risk. The maintenance of forest ecosystem health and vitality is the foundation of sustainable forest management.

3.a Area and percent of forest affected by biotic processes and agents (e.g. disease, insects, invasive species) beyond reference conditions

Rationale
This indicator identifies the impact that biotic processes and agents have on forests. Where change due to these agents and processes occurs beyond a critical threshold, forest ecosystem health and vitality may be significantly altered and a forest's ability to recover could be reduced or lost. Monitoring and measuring the effects of these processes provides information helpful in the formulation of management strategies to mitigate risk.

Current status and trends
Pine wilt disease and Japanese oak wilt are major forest pests and diseases that damage forests in Japan.

Pine wilt disease occurs when pine wood nematode (*Bursaphelenchus xylophilus*) carried by the pine sawyer beetle (*Monochamus alternatus*) enters the body of pine trees. The volume of trees damaged by the disease recorded the highest at approximately 2.43 million m^3 in 1979 but has declined over the long term. In 2022, the volume was approximately 0.25 million m^3, about 1/10 of the peak. However, it is still the country's most significant forest pest and disease, and damages still occur in all prefectures except Hokkaido in Japan.

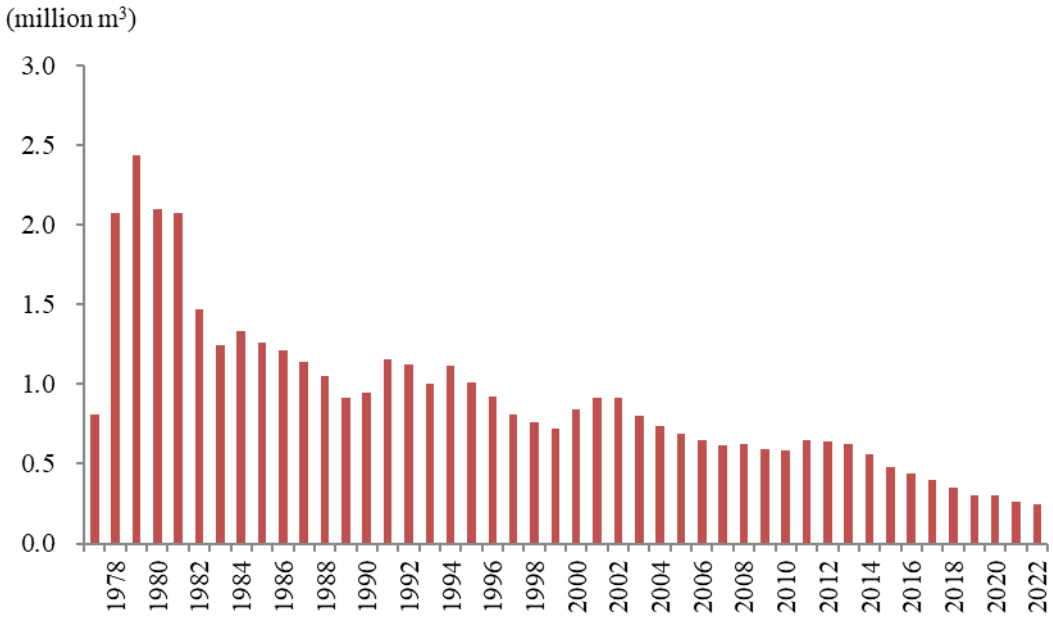


Figure 31: Changes in volume of trees damaged by pine wilt disease
Source: Forestry Agency.

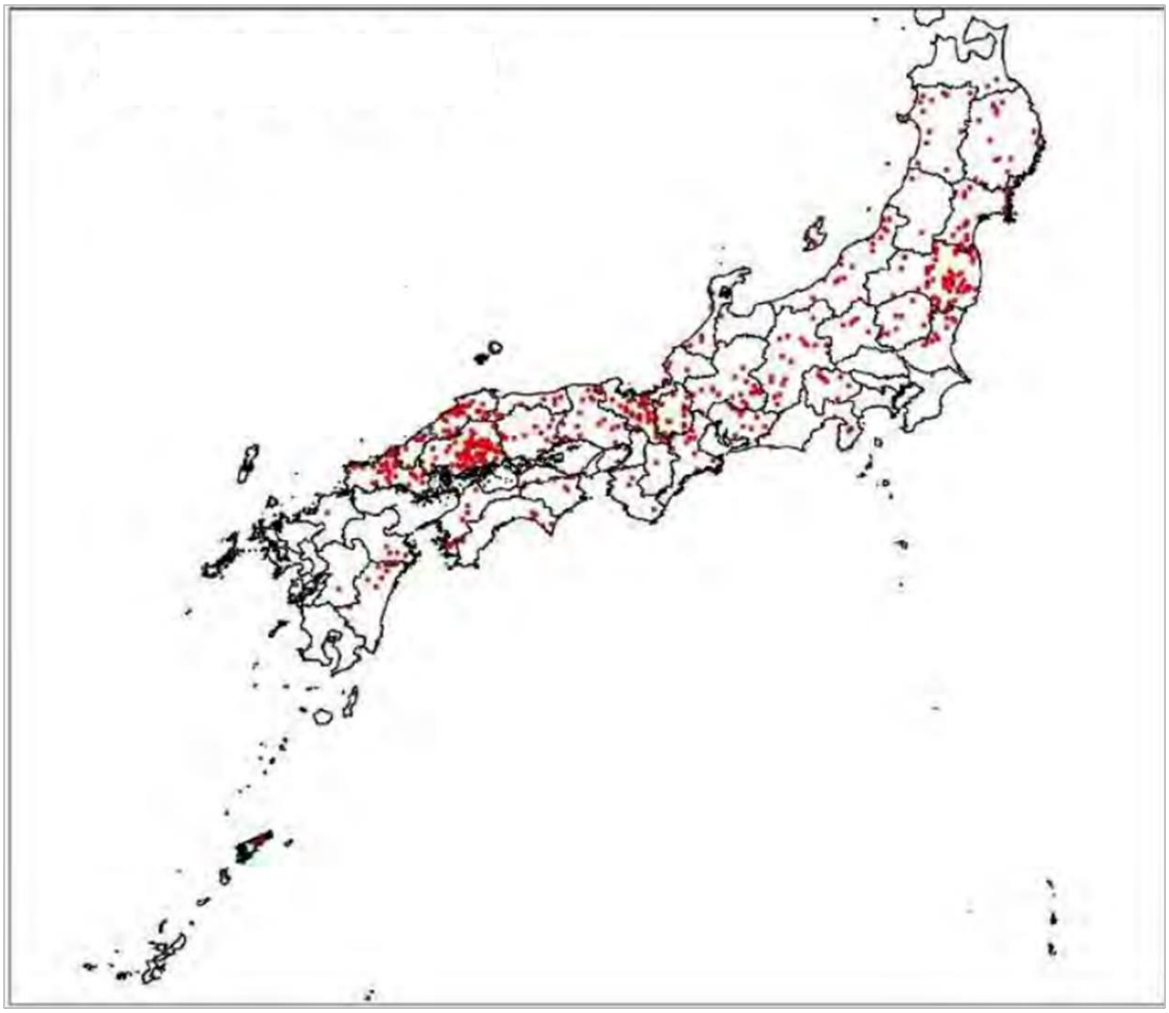


Figure 32: Distribution of plots where damage to pain trees was found
Source: Forestry Agency, the 4th National Forest Inventory survey.

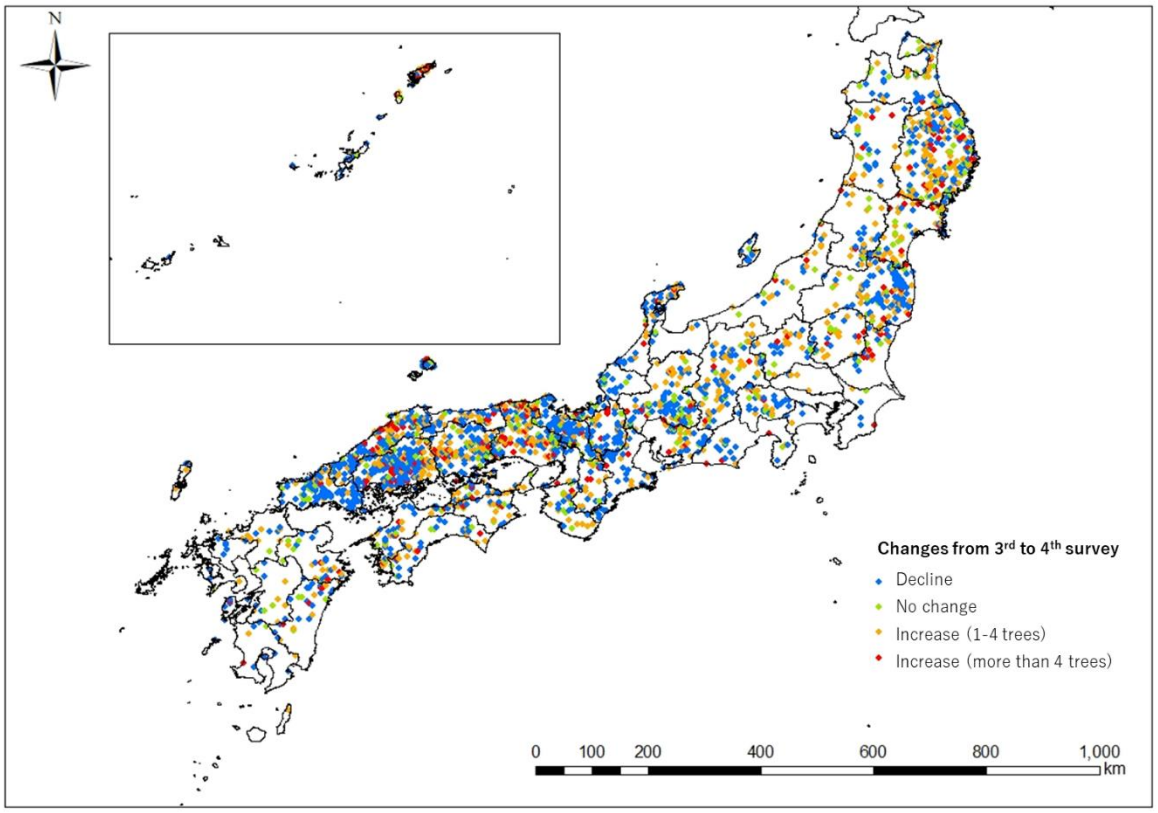


Figure 33: Changes in distribution of plots where damage to pine trees was found (comparison of the 2nd and 3rd surveys)
Source: Forestry Agency, the 3rd and 4th National Forest Inventory surveys.

In the National Forest Inventory survey, the state of weakening or withering of standing trees is also recorded. The survey is carried out through visual observation without confirming whether the weakening or withering of pine trees is caused by pine wilt disease or not. However, the survey could contain important information that shows the distribution of pine beetle syndrome. Especially in recent years, attention has been paid to the fact that the occurrence of weakening and withering of pine trees is shifting to the higher altitude areas.

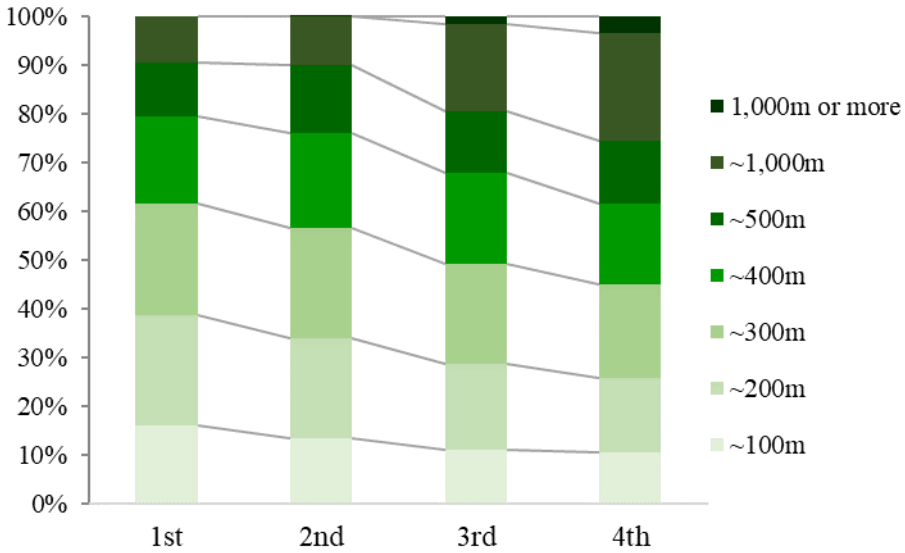


Figure 34: Ratio of plots that emerged weakening and withering of pine trees by altitude
Source: Forestry Agency, the 1st to 4th National Forest Inventory surveys.

Japanese oak wilt causes collective dieback of oak trees such as Mizunara (*Quercus crispula*), with pathogenic fungus (*Raffaelea quercivora*) mediated by the Oak platypodid beetle (*Platypus quercivorus*). It is mainly found along the Sea of Japan coast of Honshu island. The volume of tree damaged across the country was approximately 150,000 m^3 in 2022. This volume is about a half the maximum recorded in 2010, however, the damaged area extends to 41 among 47 prefectures.

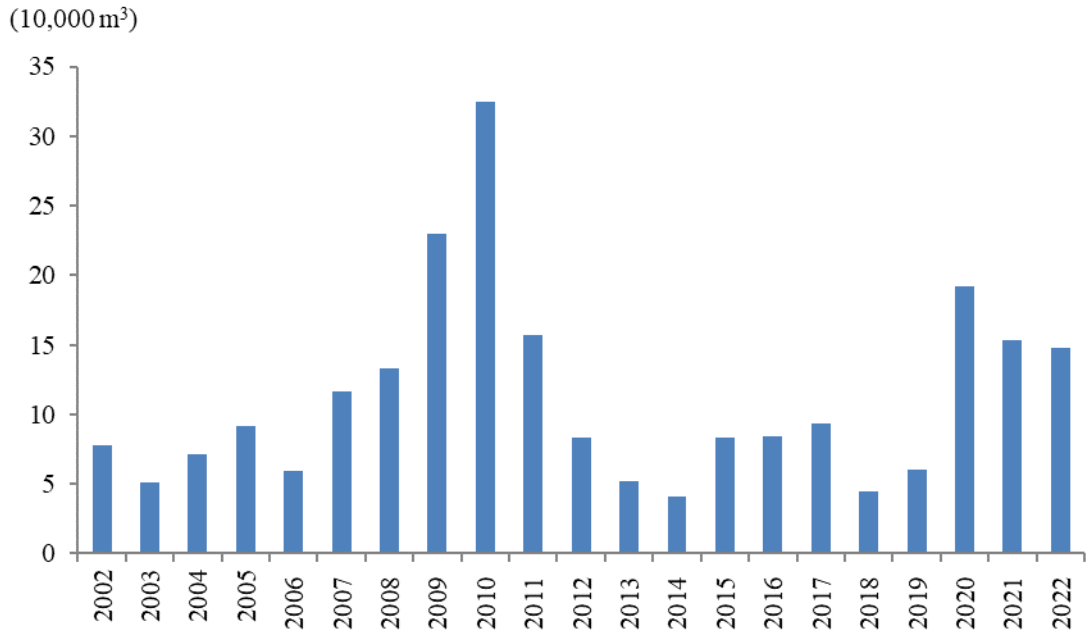


Figure 35: Changes in volume of trees damaged by Japanese oak wilt disease
Source: Forestry Agency.

Like pine wilt disease, the distribution of weakening and withering of oak trees can be grasped from the results of the National Forest Inventory.

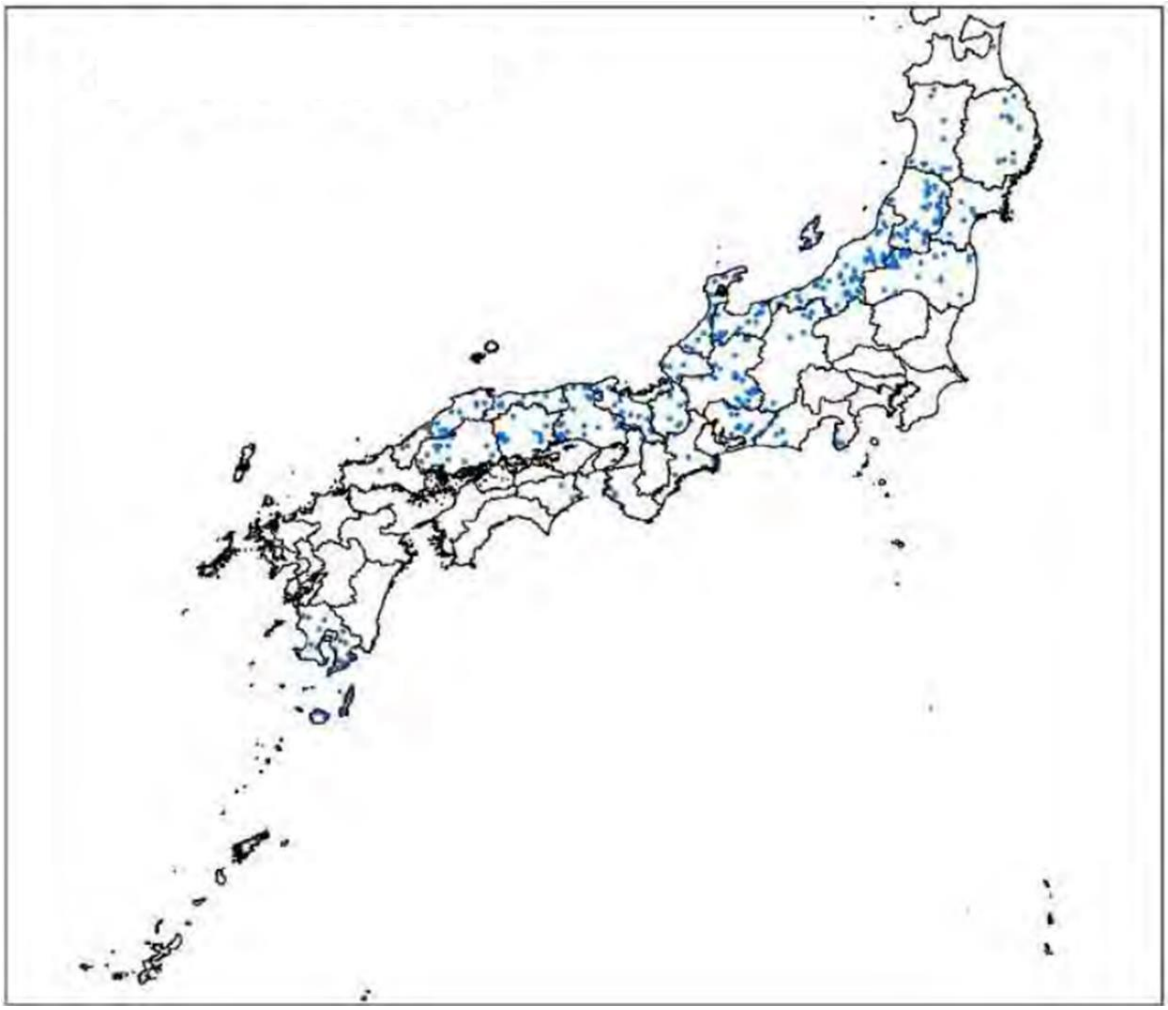


Figure 36: Distribution of plots where damage to oak trees was found
Source: Forestry Agency, the 4th National Forest Inventory survey.

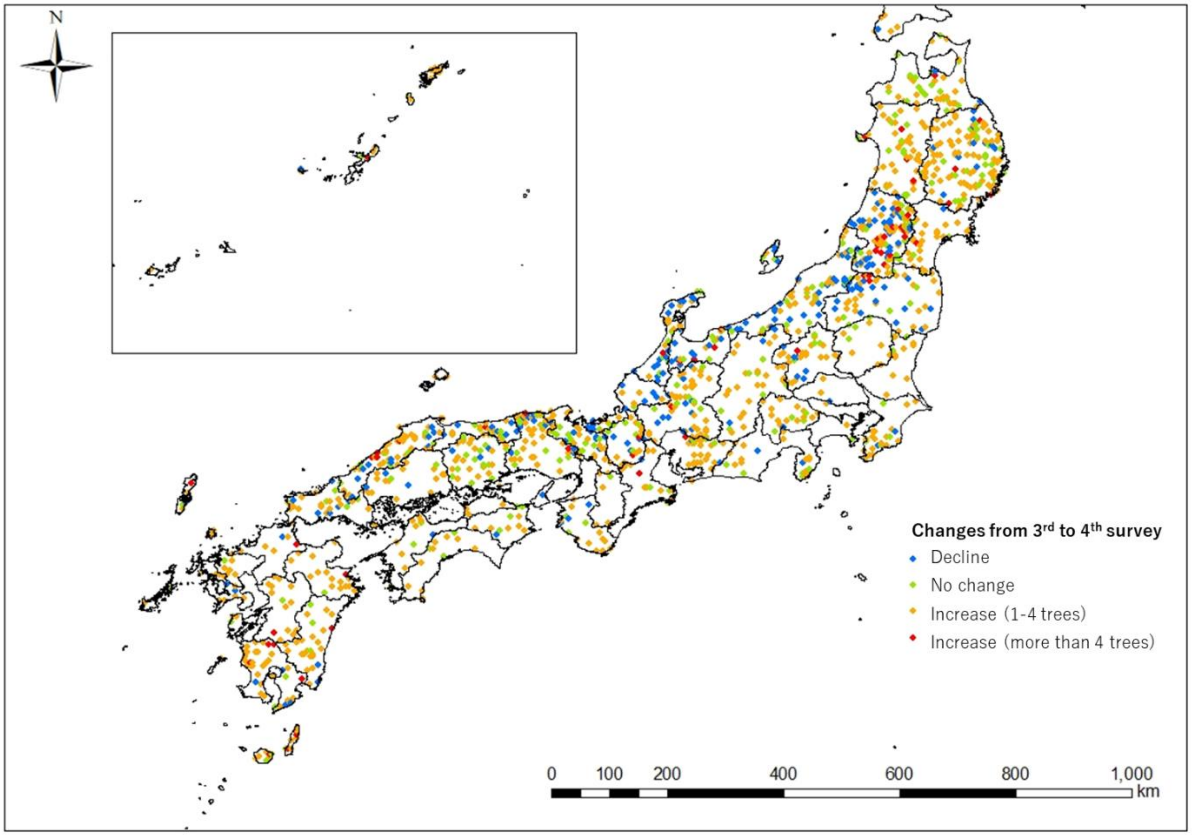


Figure 37: Changes in distribution of plots where damage to oak trees was found (comparison of the 2nd and 3rd surveys)
Source: Forestry Agency, the 3rd and 4th National Forest Inventory surveys.

Asian long-horned beetle (*Anoplophora glabripennis*) has been selected as one of the 100 of the World's Worst Invasive Alien Species by the International Union for Conservation of Nature (IUCN) because of its severe impact on a wide range of tree species. In recent years, the species has been observed in various places, such as roads, parks, and riverbeds across Honshu island. In September 2023, this species was designated as a designated invasive alien species.

In recent years, the area of forests damaged by wildlife has been decreasing due to measures such as the installation of protective fences to prevent sika deer and other mammals from entering the forest and the extermination of mice, but forest damage remains serious. The damaged area in 2022 was approximately 5,000 ha across the country, of which sika deer damage accounted for approximately 70%. Damages by sika deer lead to withering of trees or loss of the value of wood due to bark stripping of matured trees in addition to inhibition of growth or withering of trees due to browsing of young shoots and bark of planted seedlings. In some forests where the density of sika deer is substantially high, planted seedlings and understory vegetation less than approximately two meters in height can be reached by sika deer and are lost almost completely due to feeding pressure. In such places, there are concerns over the negative impact on the multiple functions of forests caused by the soil run-off due to the loss of ground vegetation damaged by sika deer stomping.

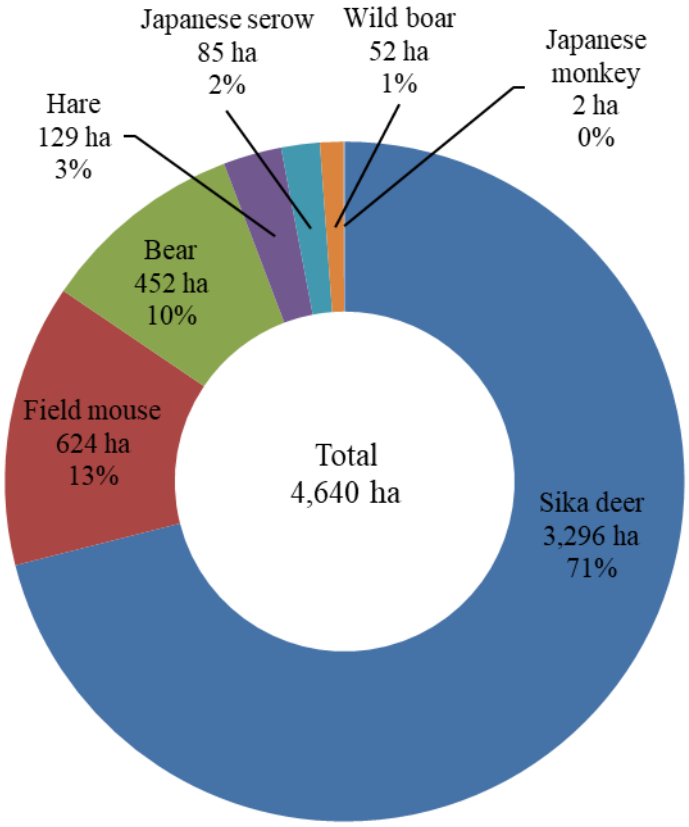


Figure 38: Areas of forest damaged by major wildlife (FY2022)
Source: Forestry Agency.

The National Forest Inventory survey also includes damages caused by wildlife (i.e., stripping and feeding damage) and information on their habitation (e.g., droppings, footprints, and furs). With respect to deer, information including the distribution of damages is shown as follows.

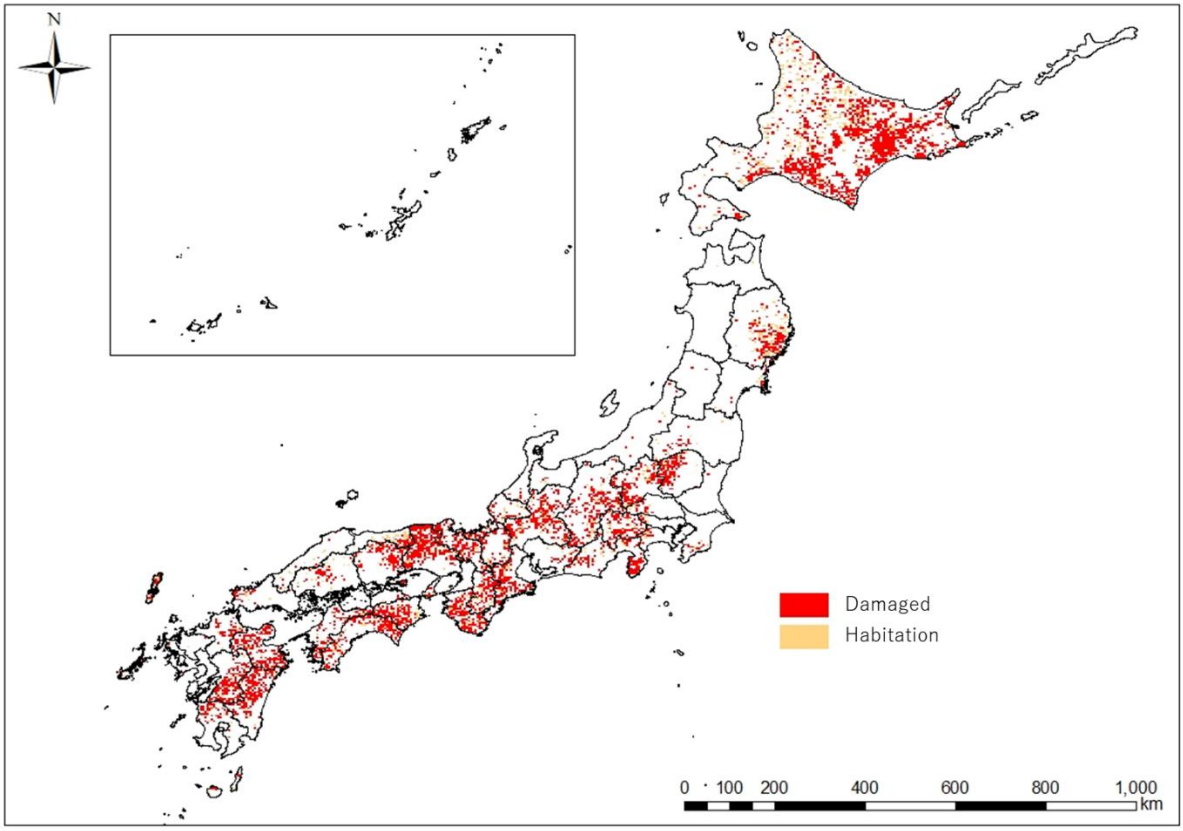


Figure 39: Distribution of plots that contain information on damages caused by sika deer or habitation of sika deer
Source: Forestry Agency, the 4th National Forest Inventory survey.

Some exotic species are invasive and threaten the ecosystem by eating the native species in Japan or depriving their habitat or food, thereby posing a serious problem in conserving the biodiversity of Japan in which the biota and ecosystems unique to each area are formed. In Japan, invasive alien species have been designated under the Act on the Prevention of Adverse Ecological Impacts Caused by Designated Invasive Alien Species, and their importation, rearing, etc., are controlled. Following the publication of the List of Invasive Alien Species that May Cause Damage to the Ecosystem in our country formulated by the MOE and MAFF in March 2015, some designated invasive alien species were added in 2024, and as of November 2024, a total of 162 species (7 families, 13 genera, 4 species groups, 128 species, 10 crossbreed), including two conditional designated invasive alien species, have been designated.

3.b Area and percent of forest affected by abiotic agents (e.g. fire, storm, land clearance) beyond reference conditions

Rationale

This indicator identifies the impact that abiotic agents, both natural and human induced, have on forests. Where change occurs due to these agents and processes beyond a critical threshold, forest ecosystem health and vitality may be significantly altered and a forest's ability to recover from disturbance could be reduced or lost. Monitoring and measuring the extent of forest affected by physical agents provides information to guide the formulation of management strategies to mitigate risk.

Current status and trends

Natural disasters in mountainous areas caused by typhoons, snow melting, and volcanic activity, etc., such as hillside failures and debris flow, tend to occur due to Japan's geographic nature, including its steep terrain, geological vulnerability, steep river water flow and global location in a volcanic zone.

Annual average precipitation is approximately 1,718 mm, about 1.5 times as much as the global average (approx. 1,161 mm). Some precipitation is brought as torrential rain during the rainy season from early June to mid-July, the typhoon season from July to October, and snowfall in the winter season. Furthermore, the country is located within the Pacific Rim seismic zone and is prone to seismic and volcanic activity. As a result, mountain disasters such as landslides, debris flows, landslides, and avalanches occur frequently every year. In addition, in recent years, in addition to the increasing trend in intense rainfall, heavy rainfall events are likely to be more frequent possibly due to the climate change. Thus, there are concerns about the increasing risks of natural disasters in mountainous areas, especially associated with rainfall, in the future.

In the past 10 years, from 2014 to 2023, natural disasters in mountainous areas occurred at an average of approximately 1,851 sites per year, and the damages are estimated at approximately 73.7 billion yen per year. The large number of disasters in 2018 was due to the heavy rain in July of the same year, which caused numerous hillside failures and debris flows in a wide area of western Japan.

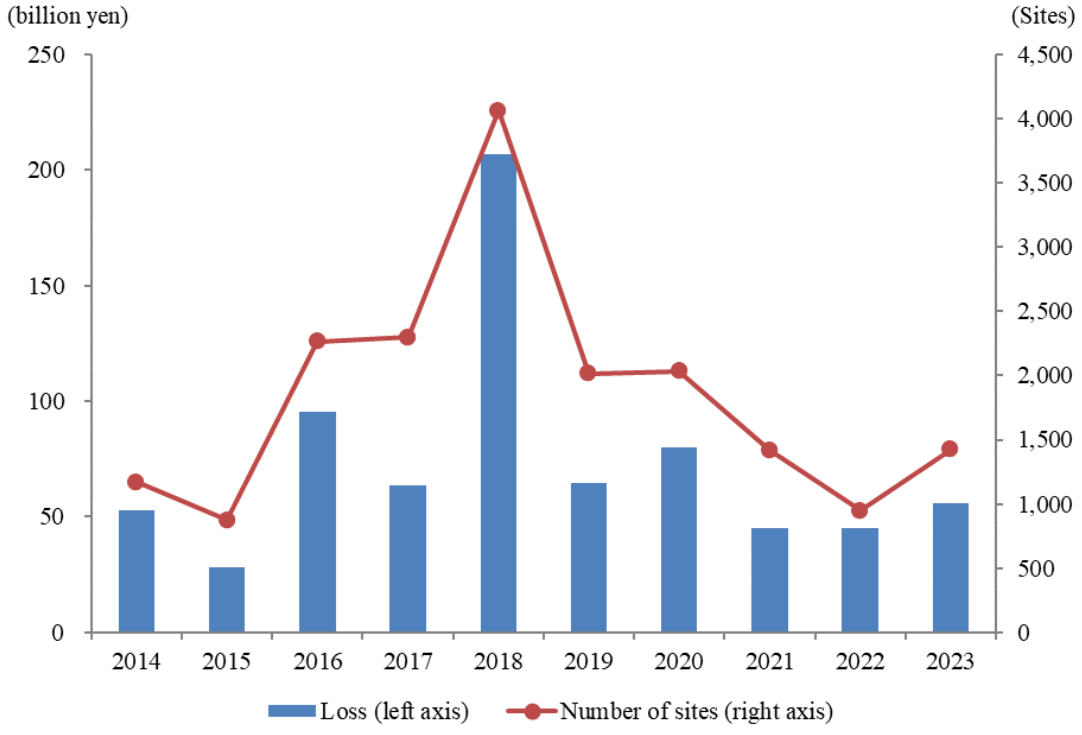


Figure 40: Changes in the state of occurrence of forest disasters in recent years
Source: Forestry Agency.

In the Great East Japan Earthquake in March 2011, the tsunami caused damage to coastal disaster prevention forests on the Pacific Ocean, approximately 140 km length in total between Aomori prefecture and Chiba prefecture, including the breakage, subsidence, and loss of seawalls and forested areas, as well as the downfall and loss of trees. In particular, in areas with low elevation and high groundwater table, the roots of trees did not extend deep into the ground, and the tsunami caused the trees to turn over and become driftwood.

Furthermore, the coastal disaster prevention forests, which were flooded by the tsunami, developed red blight (i.e., a phenomenon in which the leaves of trees turn red and die due to the effect of a large amount of salt left in the soil brought in by the tsunami.), and the required restoration of the coastal disaster prevention forests became 164 km.

The coastal disaster prevention forests helped to reduce the damage from the tsunami to some extent by mitigating the tsunami energy and preventing the inflow of drifting materials. Currently, restoration and regeneration of the damaged coastal disaster prevention forests has been carried out. As of the end of March 2024, the restoration work, such as planting, was completed for about 163 km of the total approximately 164 km required restoration.

Figure 41: Damage to coastal forests caused by the tsunami and the current state of restoration (Sendai city, Miyagi prefecture)

Forest fires have been recorded more than 5,000 ha annually until the 1980s but have been tracking a downward trend and declined to approximately 700 ha per year from 2018 to 2022. In Japan, forest fires are more likely to occur during the dry season from winter to spring. When combined with conditions such as strong winds, there is a risk that these fires may spread on a large scale. The causes of forest fires in Japan are mostly human-induced, such as the careless handling of open fires and slash burning. There are several activities for preventing forest fires, such as awareness-raising activities, including forest patrol and nationwide campaigns for forest fire prevention, and institutional development of early warning and control systems.

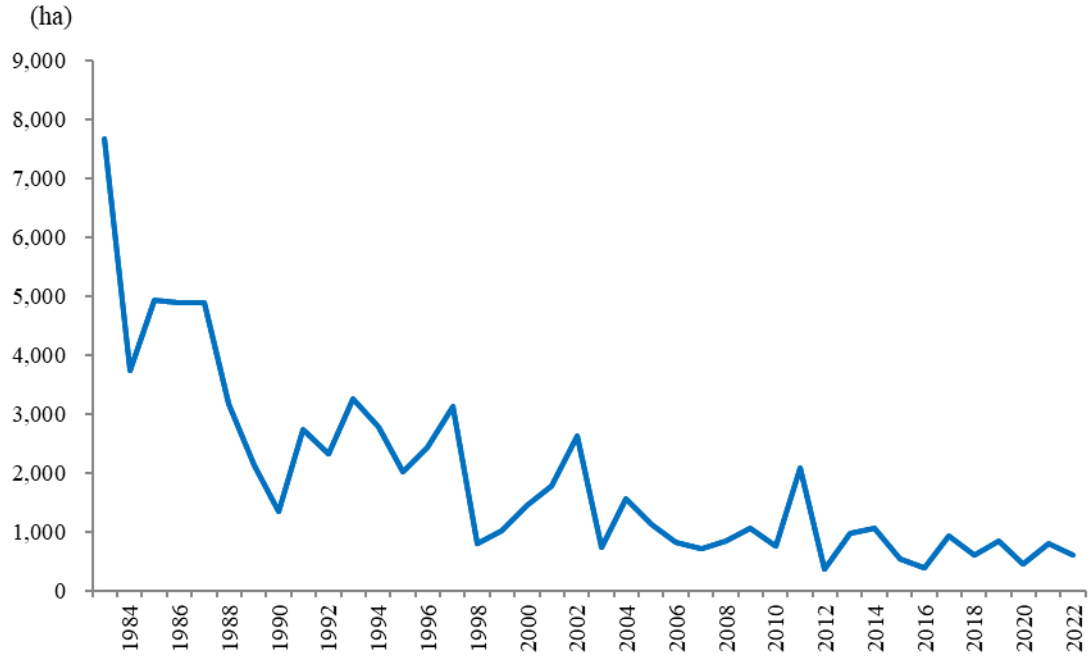


Figure 42: Changes in the area of forest burned by forest fires
Source: Forestry Agency.

According to the National Forest Inventory survey results, the percentage of damaged plots has increased from the first to the fourth survey period. During the 4th survey period (i.e., five years from 2014 to 2018), 21% of our country's forests were somewhat damaged.

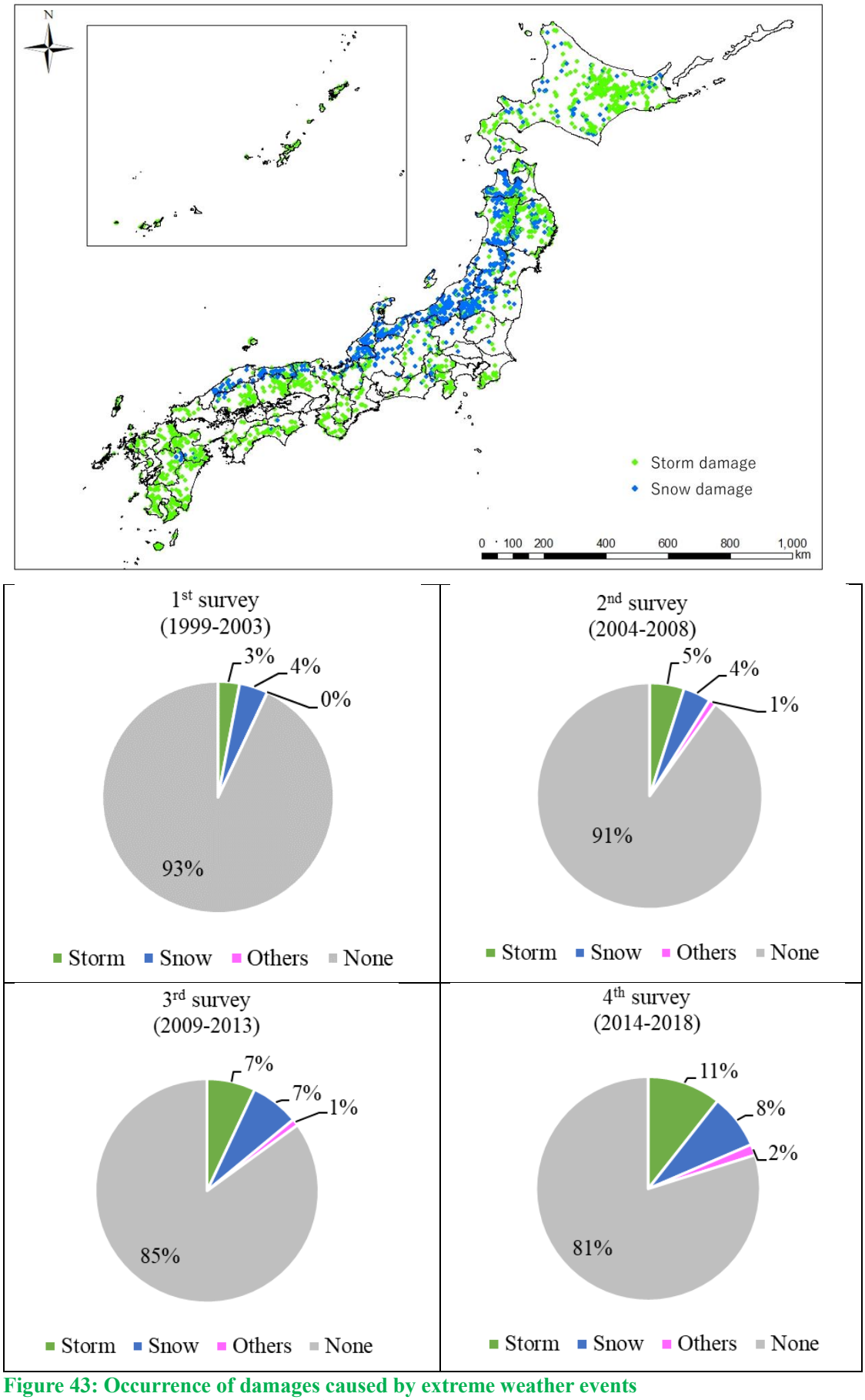


Figure 43: Occurrence of damages caused by extreme weather events
Source: Forestry Agency, the 1st to 4th National Forest Inventory surveys.

Criterion 4: Conservation and maintenance of soil and water resources

Soil and water underpin forest ecosystem productivity and functions. Forest ecosystems play an important role in the regulation of surface and groundwater flow and, together with associated aquatic ecosystems and clean water, they are essential to the quality of human life.

The interactions of soil, water, climate, topography, and biological activities influence the character and health of streams and rivers flowing through and from forests. Monitoring change in the chemical, physical, and biological characteristics of soil, water and aquatic systems provides valuable information to support sustainable forest management.

Forest management activities can significantly alter forest soils, water quality and quantity, and associated aquatic habitats. Appropriate forest management can protect and conserve the soil and water values of a forest and of downstream land uses. Inappropriate management may result in soil compaction, soil erosion, loss of riparian buffering capacity, increased sediment loads in streams, degradation and destruction of riparian and aquatic habitats and altered flow regimes. The quantity of water flowing from a catchment can vary due to forest management activities in the catchment, including both forest harvesting and the establishment of new forests, depending on previous land use in that catchment. Change in water flow can lead to an increased risk of flooding or to a reduction in the quantity and flow of water in streams and affect other land use activities downstream. Both outcomes can have detrimental implications for human safety, property, and economies.

Soil and water health, quality and resources may be protected through the allocation of land for that purpose or through appropriate management regimes and best management practices.

4.1 Protective function

Healthy and productive forests depend on the maintenance of the soil and water resource. Forests also regulate these resources by moderating the flow of water, controlling erosion, maintaining water quality, and preventing catastrophic events such as flooding, avalanches and mudslides.

4.1.a Area and percent of forest whose designation or land management focus is the protection of soil or water resources

Rationale:
The area and percent of forest designated or managed primarily for the protection and regulation of soil and water reflects the importance of these resources to society, including the tradeoffs made between other uses.

Current status and trends
Currently, approximately 12 million ha of forests, which account for 49% of the total area of Japan's forests, are designated as the protection forest for the conservation of soil and water resources.

The area of these protection forests has constantly increased since their establishment in 1897. Protection forests are forests designated by the MAFF or the prefectural governor for achieving specific public objectives, such as headwater conservation, disaster prevention, including erosion control, and formation of living environments. In the protection forests, logging operations and changes to the form and nature of land, etc., are regulated to secure the function of forests in line with their respective purposes. There are 17 types of protection forests based on the designated objective, including those other than water resource conservation and soil conservation as mentioned herein.

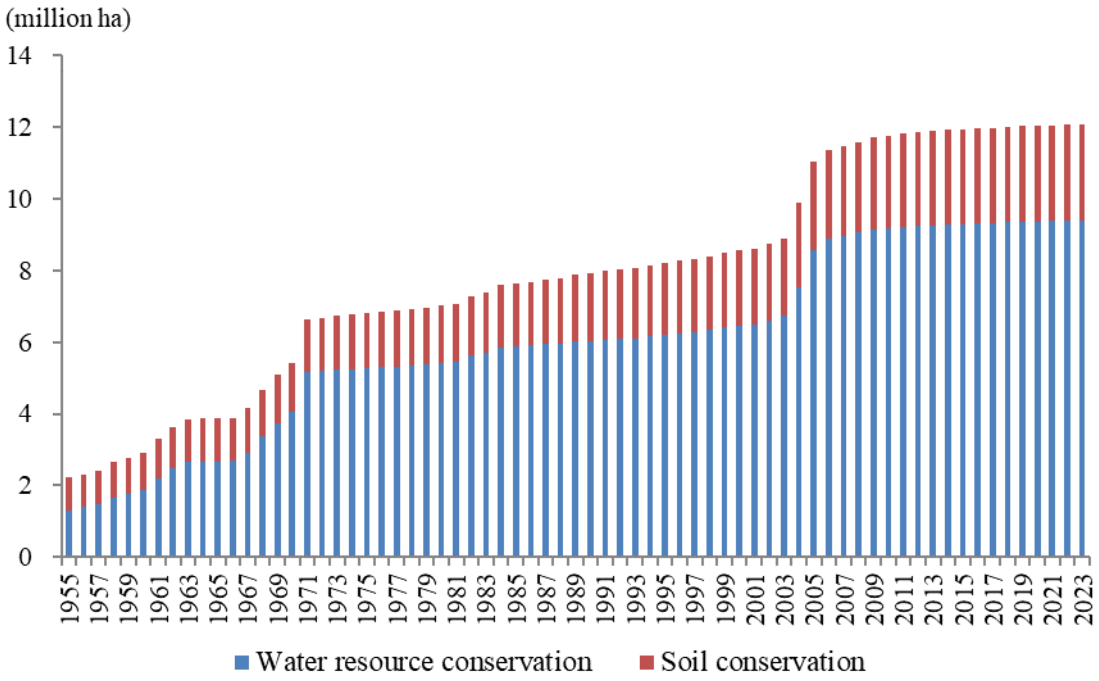


Figure 44: Changes in the area of protection forests for soil and water resource conservation
Note: Soil conservation shows the total area of protection forests for soil run-off prevention and landslide prevention while water resource conservation shows the total area of protection forests for headwaters conservation and drought prevention control.
Source: Forestry Agency.

Table 8: Area of protection forests related to water resource and soil conservation

Category		Protection forest area (ha)
Water resource conservation	Headwaters conservation	9,263,376
	Drought prevention control	126,289
	Subtotal	9,389,665
Soil conservation	Soil run-off prevention	2,618,186
	Landslide prevention	60,504
	Subtotal	2,678,690
Total		12,068,355

Source: Forestry Agency (March 2023).

Table 9: Categories of protection forests

1	Headwaters conservation
2	Soil run-off prevention
3	Landslide prevention
4	Sifting sand prevention
5	Windbreak
6	Flood damage prevention
7	Tidal wave and salty wind prevention
8	Drought prevention control
9	Snow drift prevention
10	Fog inflow prevention
11	Snow avalanche prevention
12	Rock fall prevention
13	Fire protection
14	Fish breeding
15	Navigation landmark
16	Public health
17	Scenic site conservation

4.2 Soil

Forest soils support forest productivity and other ecological and hydrological functions through their ability to cycle, hold and supply water and nutrients, store organic matter and provide habitats for plant roots and for a wide range of soil organisms. These soil related functions mainly occur on or near to the forest floor. A reduction or loss of the soil resource, or the inappropriate disturbance of the forest floor, may result in a decline and degradation in forest health and in the provision and regulation of other ecosystem services.

4.2.a Proportion of forest management activities that meet best management practices or other relevant legislation to protect soil resources

Rationale
This indicator provides information about the extent to which soil resource protection, legislation and best management practices have been identified and integrated into forest management activities. Inappropriate activity may result in loss, compaction, contamination or degradation of soils, which in turn causes the loss of soil nutrients, forest productivity and other ecosystem services that soils provide.

Current status and trends
As stated in Indicator 4.1.a, protection forests are designated for the conservation of soil and water resources and other purposes. As of 2023, approximately 3 million ha forests are designated as protection forests, mainly for the conservation of soil resources. In protection forests, logging operations and changes to the form and nature of land, etc., are regulated in line with the respective purpose. A technical guideline is provided for the effective and efficient implementation of the forest conservation program, which is carried out to restore devastated forests and forest land.

As a basic guideline on the handling of forests toward the fulfillment of the multiple forest functions, the Nationwide Forest Plan establishes guidelines on forest management practices and protection for each of (1) water resource conservation, (2) mountainous disaster prevention and soil conservation, (3) comfortable environment creation, (4) health and recreation, (5) culture, (6) biological diversity conservation, and (7) timber production functions.

For forests requiring the prevention of soil run-off, hillside failure, or other mountainous hazards, including forests at risk of a landslide, etc. that could involve human lives and damage houses and other facilities, the Nationwide Forest Plan promotes improvement and conservation to maintain and enhance mountainous disaster prevention and soil conservation functions. Specifically, to develop a disaster-resilient national land, the Nationwide Forest Plan sets forth the promotion of management practices to reduce and avoid forest-floor denudation and management practices using natural forces considering the topography, nature of the soil, and other geological conditions. For areas with a high risk of such mountainous hazards close to rural communities, the plan promotes the designation and appropriate management of protection forests to secure the fulfillment of the functions for preventing sediment outflow. In case it is necessary, to prevent erosion of riverbanks or stabilize mountain slopes etc., the plan promotes the installation of facilities such as simple check dams and retaining walls.

Forest areas designated for the maintenance and enhancement of mountainous disaster prevention and soil conservation functions are identified through different planning frameworks depending on ownership, the Municipal Forest Plan, which municipal mayors formulate for private forests, and in the Regional Plan for national forest.

Currently, 4.89 million ha have been designated nationwide for this purpose. These forests are managed in accordance with the management policies in the aforementioned plans, as well as in compliance with relevant guidelines and regulations, including technical guidelines for forest conservation, facility management guidelines for proper management of forest conservation facilities, and other relevant rules and standards.

4.2.b Area and percent of forest land with significant soil degradation

Rationale

This indicator provides information on the extent of significant soil degradation in forests likely to affect productivity, hydrology, ecosystem processes or social and cultural benefits. This indicator is primarily concerned with degradation caused directly or indirectly by human activity.

Current status and trends

The situation of forest soil erosion was assessed in the 4th National Forest Inventory (2014-2018). Specifically, incidences of rill or gulley are considered soil erosion and are checked in the vegetation survey area set up in plots. Soil erosion was found in 3% of the plots: i.e., rills for 2% and gullies for 1%. Regarding geographical distribution, soil erosion seems to be found more often in plots in central and western regions. Whether the soil erosion was caused by human-induced activities or natural processes cannot be determined.

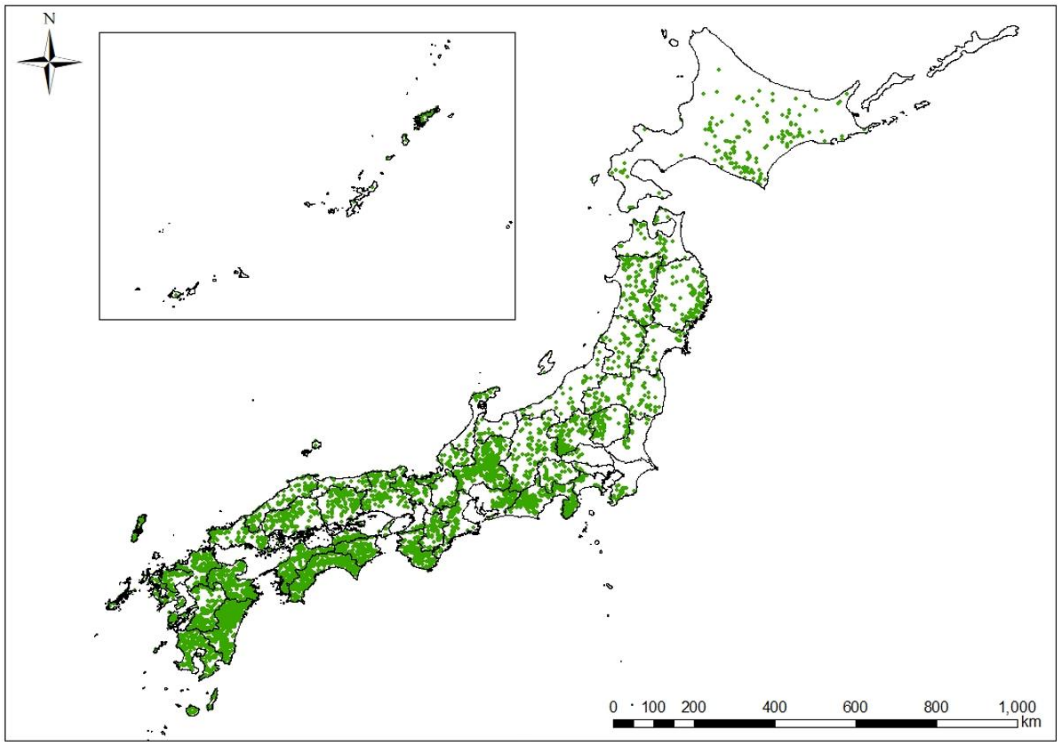


Figure 45: Distribution of plots where soil erosion was found

Source: Forest Agency, the 4th National Forest Inventory survey.

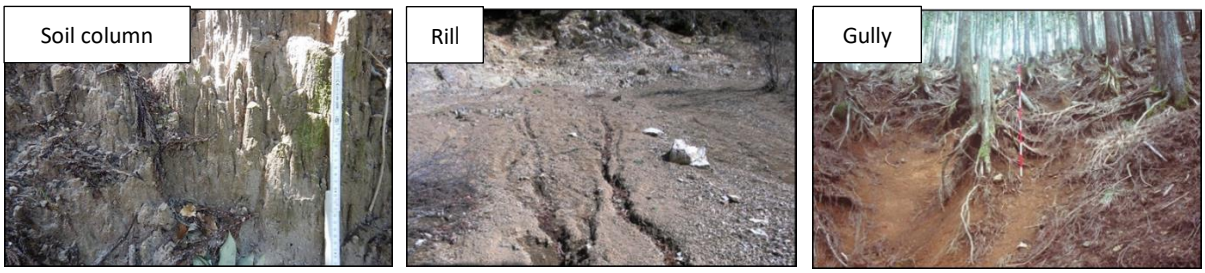


Figure 46: Soil erosion marks

Source: Forestry Agency.

Looking at the percentage of the plots with rill and gully by forest type, the ratio was 3% for planted forests and 2% for natural forests. No significant differences were found.

Note that judgment regarding soil columns is likely to vary among soil erosion incidences.

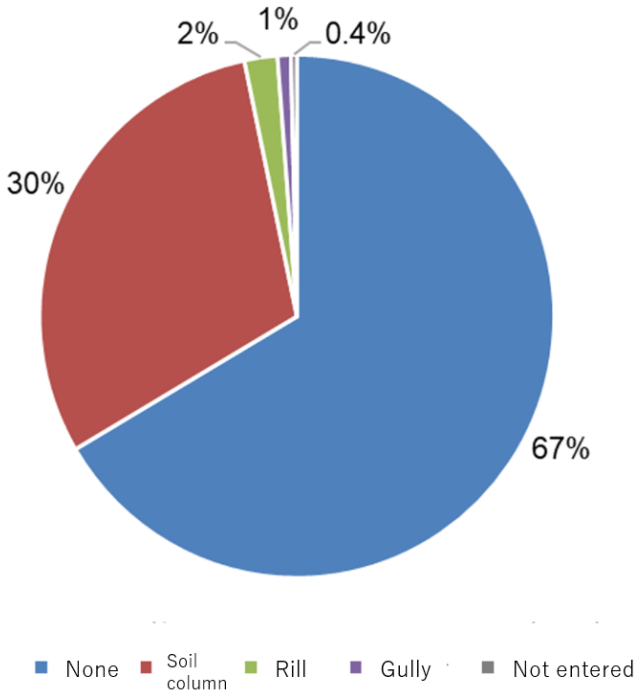


Figure 47: Percentage of plots with soil erosion
Source: Forest Agency, the 4th National Forest Inventory survey.

The percentage of forest floor cover (i.e., the percentage of the ground surface covered by plant-derived cover recorded in units of 10%) in the 4th National Forest Inventory survey was 84% for covering 80% or more to 100%, 13% for 50% or more to less than 80%, and 3% for 0% or more to less than 50%.

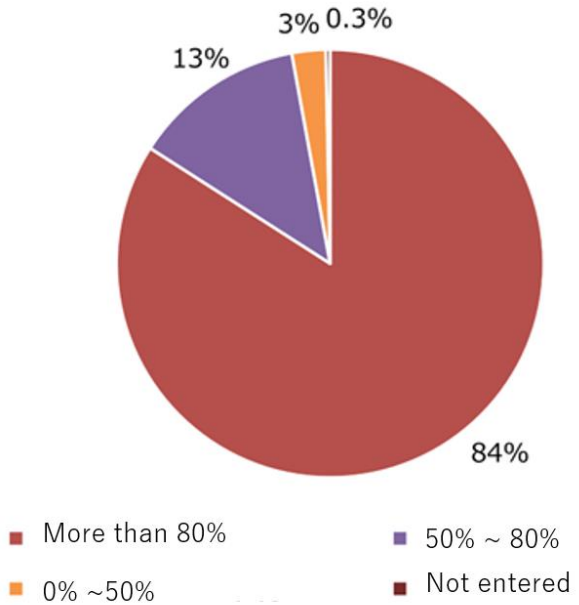


Figure 48: Percentage of plots by forest floor cover rate
Source: Forestry Agency, the 4th National Forest Inventory survey.

4.3 Water

Water is one of the most valuable of forest ecosystem services. Forests and soils and how they are managed, influence the quantity, quality and timing of surface-water and ground-water flows. This includes changes to forest structure and species composition through planned activities including timber harvesting and planting of forests on previously non-forest land, and unplanned activities such as wildfire. Changes to water quality and flow can have a severe impact on forest resources as well as human wellbeing. In addition, associated aquatic and riparian forest habitats are some of the most biologically diverse and productive forest ecosystems.

The quality and quantity of water flowing from forested areas, including annual and longer-term patterns, are commonly regarded as key components in an indicator of the quality of forest management. Water quality and quantity is widely understood to be measures that capture many potential impacts on forest sustainability and are a good indicator of overall ecosystem health.

4.3.a Proportion of forest management activities that meet best management practices, or other relevant legislation, to protect water related resources

Rationale

This indicator provides information about the extent to which water resources have been identified and safeguarded during forest management. This indicator is primarily concerned with activities that may affect riparian zones, water quality, quantity and flow rather than the designation of land for water-related conservation. The protection of the water resources and associated forest and aquatic ecosystems is vital for the human populations dependent on them.

Current status and trends

As stated in Indicator 4.1.a, protection forests are designated for the conservation of soil and water resources and other purposes. As of 2023, about 9 million ha of forests are designated as protection forests, mainly for the conservation of water resources. In protection forests, logging operations and changes to the form and nature of land, etc., are regulated in line with the respective purpose. A technical guideline is also provided for the effective and efficient implementation of the forest conservation project, which is carried out to restore devastated forests and forest land. In addition, as a basic guideline on the handling of forests toward the fulfillment of the multiple functions of forest, the Nationwide Forest Plan has established guidelines on forest management practices and protection for each of (1) water resource conservation, (2) mountainous disaster prevention/soil conservation, (3) comfortable environment creation, (4) health and recreation, (5) culture, (6) biological diversity conservation, and (7) timber production functions.

In the Nationwide Forest Plan, the improvement and maintenance of water resource conservation functions will be promoted for forests surrounding water sources situated in dam catchment or upstream of major rivers as well as forests around reservoirs, water welling places, mountain streams, and other places important as a region's water source. Specifically, to secure a stable supply of quality water, appropriate tending and thinning activities will be encouraged, along with the promotion of management practices to nurture understory vegetation and root systems. In addition, ground vegetation stripping associated with logging will be reduced and dispersed, and management practices using natural potentials will be promoted, including the development of multilayered mixed forests of coniferous and broad-leaved species in plantations of interior headwater forests. The designation and appropriate management of protection forests will be promoted to ensure the fulfillment of water resource conservation functions upstream of dams and other water-utilization facilities.

Forest areas for maintaining and enhancing the water resource conservation function are identified in the Municipality Forest Plan formulated by the municipal mayor for private forests and in the Regional Plan for national forest. Currently. 16.79 million ha have been designated across the country. These forests are managed in line with the management practice policy set forth in the respective plans and other relevant rules and guidelines.

4.3.b Area and percent of water bodies, or stream length, in forest areas with significant change in physical, chemical or biological properties from reference conditions

Rationale:
This indicator provides information relating to water quality in forests. Significant changes in the physical, chemical or biological properties of water in forest lakes, rivers and streams may reveal the extent to which management activities or natural events are affecting water quality.

Maintaining water quality is important for human use and consumption and to support healthy forest and aquatic ecosystems. Where water quality is being adversely affected by human activity, forest management practices may be adapted to protect water values.

Current Status and Trends
In Japan, systematic monitoring of water quality in forest areas has not been conducted on a nationwide scale. As an attempt to monitor changes in water quality in forest areas, there is "Forest Atmospheric Depositions and Stream Water Chemistry Database (FASC-DB)" created by the FFPRI. The database was constructed using water quality data on precipitation and mountain streams observed at institute branches since 1991 and related information on water quality observation points. The database includes water quality analysis values (pH, EC, Na^{+}, K^{+}, Ca^{2+}, Mg^{2+}, NH_4^{+}, Cl^{-}, NO^{3-}, PO_4^{3-}, SO_4^{2-}, etc.) for precipitation (precipitation in and out of forest, and stem flow) and torrent water. According to the Database, no significant change has been found in the water quality of mountain streams to date.

Since FY2011, Forestry Agency, in cooperation with the FFPRI, has been monitoring the concentration of radioactive cesium in mountain stream water in forests in Fukushima Prefecture due to the accident at the TEPCO (Tokyo Energy Partner, Incorporated)'s Fukushima Daiichi Nuclear Power Station accompanying the Great East Japan Earthquake that occurred in March 2011 provide an example of an impact on the water quality of mountain streams in forest areas.

As of 2023, more than 90% of the radioactive cesium in forests was distributed in the soil, and most of the radioactive cesium was found in the surface 0~5 cm of the soil. Almost no radioactive cesium was detected in the mountain stream water flowing from the forest, and radioactive cesium was detected in some samples on days of rainfall. It was assumed this was mainly due to particles such as fine soil mixed in the mountain stream water after filtration.

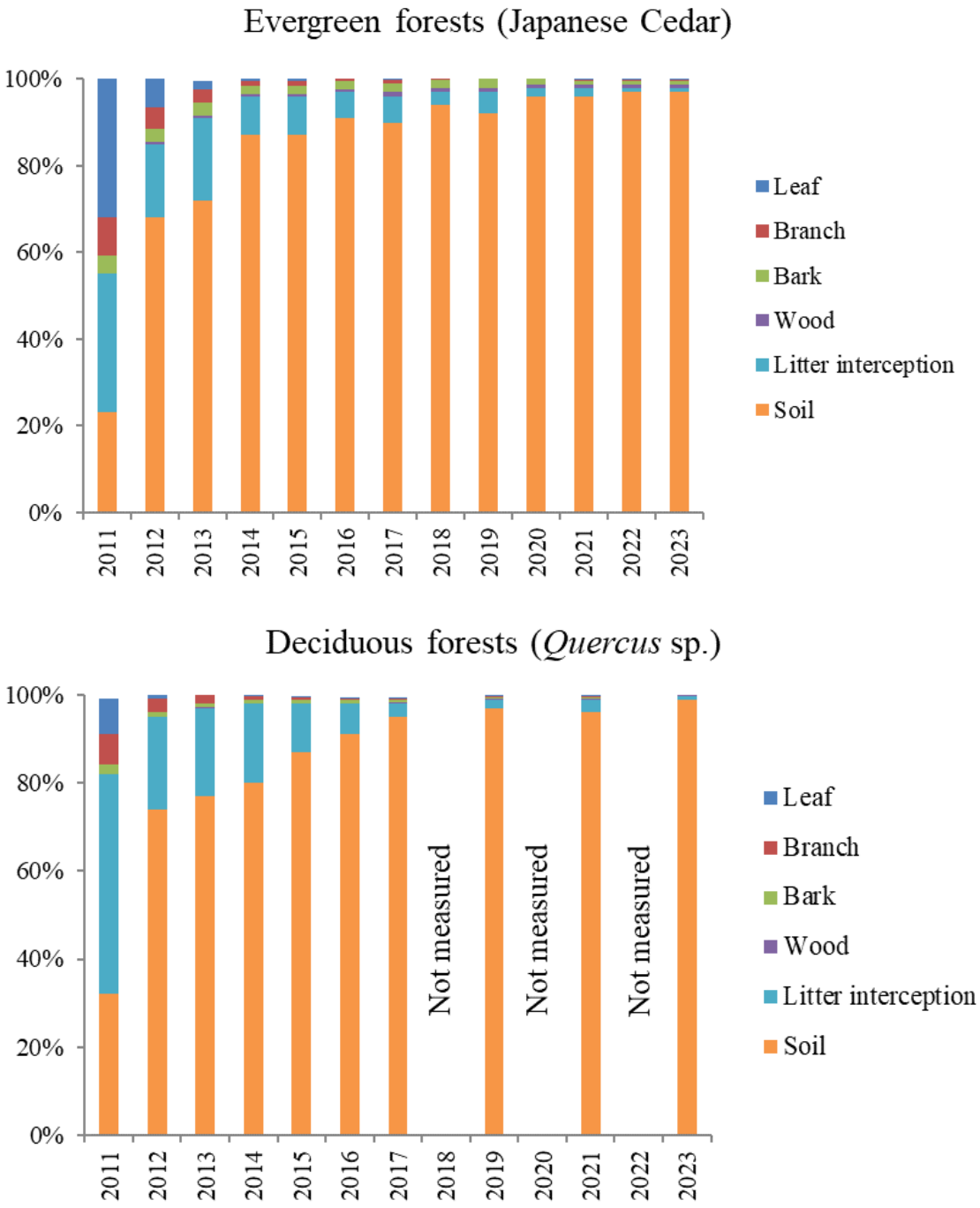


Figure 49: Changes in the percentage of radioactive cesium accumulation in the forest ecosystem
Source: Forest Agency, Result of Survey on Radioactive Substance Distribution in Forests in FY2023.

Criterion 5: Maintenance of forest contribution to global carbon cycles

Forests are renewable and one of the largest terrestrial reservoirs of biomass and soil carbon. They have an important role in global carbon cycles as sinks and sources of carbon. Carbon stocks in forests include above ground biomass, belowground biomass, dead and decaying organic matter and soil carbon. Carbon is also stored in wood products.

The biosphere has a significant influence on the chemical composition of the atmosphere. Vegetation draws CO_2 from the atmosphere, through photosynthesis and returns it through respiration and the decay of organic matter. The interchange between the biosphere and atmosphere is large; approximately a seventh of total atmospheric CO_2 passes into vegetation each year.

Global climate change could have significant impacts on the structure, distribution, productivity, and health of temperate and boreal forests as well as impacts on forest carbon stocks and fluxes, and the prevalence of forest fires, disease and insect outbreaks, and storm damages.

Forest management practices also affect the carbon cycle and fluxes. Deforestation has a negative impact, but management activities that maintain and enhance the carbon stored in forests and forest products over the medium to long term can make a positive contribution to mitigating atmospheric carbon dioxide levels. In addition, biomass from forests can be used as a substitute for fossil fuels, thereby reducing greenhouse gas emissions.

Change in the global carbon cycle and associated climate change will have major impacts on human wellbeing, especially rural communities and indigenous peoples dependent directly on the natural environment.

5.a Total forest ecosystem carbon pools and fluxes

Rationale
This indicator provides information on the total amount of carbon stored in forest ecosystems. It also describes changes, fluxes or flows in carbon between forests and the atmosphere. A better understanding of these processes will aid the development of appropriate responses to the effects of climate change.

Current status and trends
In Japan, the total amount of carbon stored in trees is approximately 2 billion tons. Approximately 80% of the carbon stock is stored in the above ground of trees and the rest is stored in their below ground.

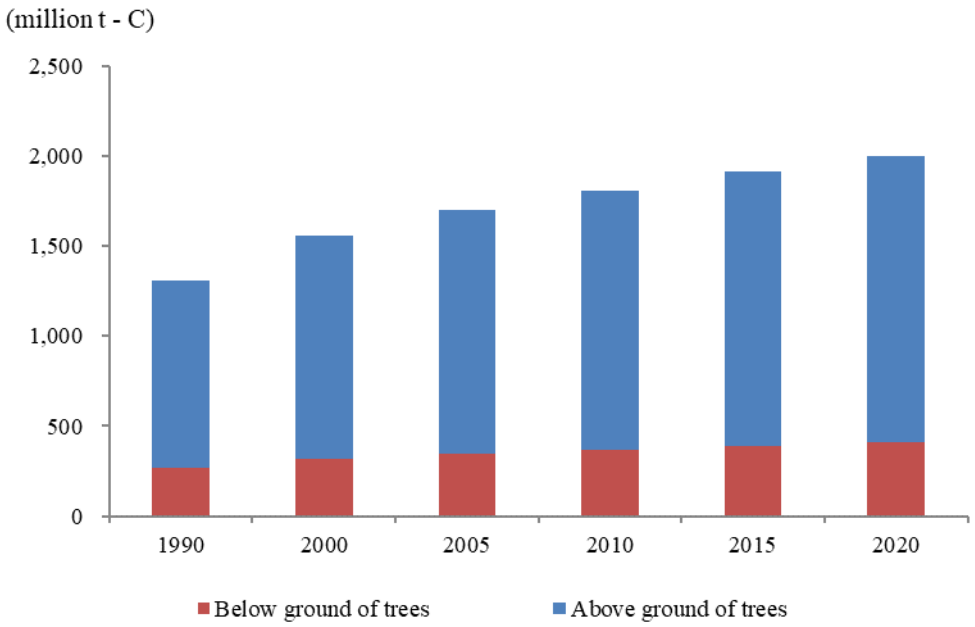


Figure 50: Changes in the carbon stocks in trees
Source: Forestry Agency.

The amount of carbon stored in the forest ecosystem other than trees is shown in the results of the survey conducted during the period from 2006 to 2022. In combination with the amount of carbon stored in trees mentioned above, the ratio of carbon stored in the forest ecosystem is estimated to be 41% in the soil, 37% in the above-ground biomass, 9% in the below-ground biomass, 10% in dead trees, and 3% in litter in 2020.

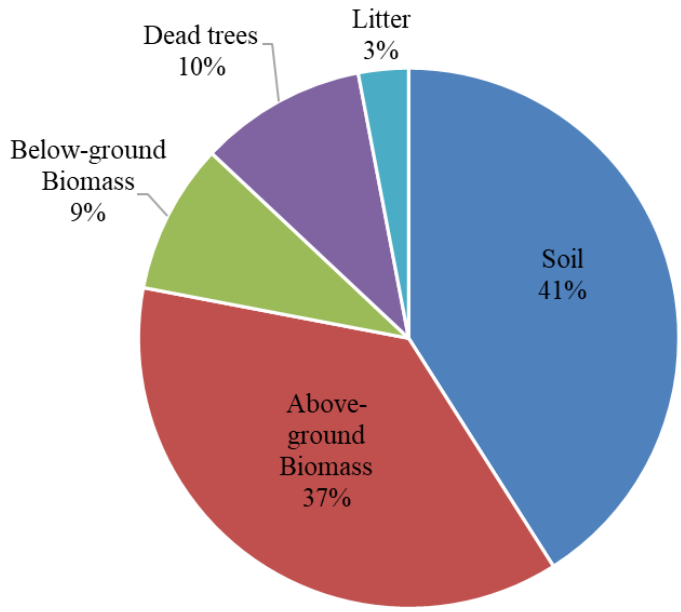


Figure 51: Ratio of carbon stored in the forest ecosystem
Source: Forestry Agency.

Regarding the carbon flux, it is estimated that Japan's forests absorbed approximately 16.28 million tons of carbon (approximately 59.8 million CO_2 tons) from the atmosphere in FY2022.

Table 10: Changes in GHG emissions and absorptions by forests

Category	Carbon pool	Unit	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
4.A. Forest land	Total	kt-CO_2	-94,291	-100,794	-100,787	-101,185	-89,497	-83,604	-80,507	-73,793	-68,999	-70,793	-68,983	-64,462	-65,851	-63,595	-59,763
	Living biomass	kt-CO_2	-88,232	-93,014	-93,810	-96,074	-80,325	-75,437	-72,667	-66,280	-61,779	-63,796	-62,204	-57,968	-59,578	-57,613	-54,029
	Dead wood	kt-CO_2	-2,860	-3,803	-2,837	-1,082	-3,541	-3,786	-3,864	-3,943	-4,037	-4,147	-4,249	-4,311	-4,408	-4,447	-4,510
	Litter	kt-CO_2	-2,697	-2,352	-1,774	-1,078	-323	27	129	228	304	343	380	429	474	518	564
	Mineral soil	kt-CO_2	-503	-1,625	-2,367	-2,950	-5,308	-4,407	-4,105	-3,799	-3,487	-3,195	-2,909	-2,613	-2,339	-2,053	-1,788
	Organic soil	kt-CO_2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4.A.1. Forest land remaining Forest land	Total	kt-CO_2	-84,713	-96,616	-98,099	-99,212	-88,094	-82,310	-79,275	-72,627	-67,895	-69,754	-68,017	-63,574	-65,039	-62,860	-59,107
	Living biomass	kt-CO_2	-82,157	-90,347	-92,084	-94,808	-79,401	-74,576	-71,844	-65,500	-61,039	-63,092	-61,548	-57,361	-59,020	-57,103	-53,570
	Dead wood	kt-CO_2	-2,530	-3,658	-2,743	-1,012	-3,489	-3,739	-3,819	-3,900	-3,996	-4,108	-4,214	-4,278	-4,377	-4,419	-4,485
	Litter	kt-CO_2	-2,019	-2,055	-1,581	-934	-217	123	221	316	388	422	453	496	536	575	615
	Mineral soil	kt-CO_2	1,993	-556	-1,692	-2,458	-4,986	-4,119	-3,833	-3,544	-3,249	-2,975	-2,709	-2,432	-2,177	-1,912	-1,667
	Organic soil	kt-CO_2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
4.A.2. Land converted to Forest land	Total	kt-CO_2	-9,578	-4,178	-2,688	-1,973	-1,404	-1,294	-1,232	-1,166	-1,103	-1,040	-966	-889	-812	-735	-656
	Living biomass	kt-CO_2	-6,075	-2,667	-1,726	-1,266	-924	-861	-823	-780	-740	-703	-657	-607	-558	-510	-460
	Dead wood	kt-CO_2	-330	-145	-94	-70	-51	-47	-45	-43	-41	-38	-36	-33	-30	-28	-25
	Litter	kt-CO_2	-677	-298	-193	-144	-106	-97	-92	-88	-84	-79	-73	-68	-62	-57	-51
	Mineral soil	kt-CO_2	-2,496	-1,069	-675	-493	-322	-288	-272	-255	-238	-220	-200	-181	-162	-141	-120
	Organic soil	kt-CO_2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

Source: NIES, National Greenhouse Gas Inventory Document of Japan (April 2024).

5.b Total forest product carbon pools and fluxes

Rationale

This indicator provides information on the role that forest products play in storing, cycling and releasing carbon. Forest products delay the release of carbon into the atmosphere and are more sustainable than products with manufacturing processes that have significant carbon footprints.

Current status and trends

Wood contributes to the prevention of global warming in the three aspects of storing carbon, replacing energy-intensive materials, and replacing fossil fuels. Since trees capture carbon dioxide from the atmosphere through photosynthesis and store carbon in the form of wood, long-term use of wood from sustainably managed forests in buildings and furniture will reduce atmospheric carbon dioxide. In addition, wood emits less carbon dioxide during product production than steel or concrete, so the use of wood in buildings contributes to emission reductions in the building sector. Against increasing interest in SDGs and ESG (environmental, social, and governance) investment, it is important to "visualize" the effects of wood use in buildings. In October 2021, Forestry Agency established the Guideline for the Indication of Carbon Stocks of Wood Used in Buildings as a means for building companies to publicize their contribution to carbon neutrality through using wood in buildings.

Figure 52: Examples of use of the Guideline for the Indication of Carbon Stocks of Wood Used in Buildings

Source: Forestry Agency.

In calculating and reporting forest sinks under the United Nations Framework Convention on Climate Change (UNFCCC), the rule of the First Commitment Period of the Kyoto Protocol (2008-2012) considered that carbon in timber was emitted into the atmosphere when timber is cut and carried out of the forest. However, from the Second Commitment Period (2013-2020) to the Paris Agreement (-2021), for more accurate assessment of the changes in carbon contents in wood after cutting and carrying out and to count this as greenhouse gas (GHG) removal or the relevant country's emissions, countries can count changes in the carbon

content stored in wood used for buildings, etc. (i.e., harvested wood product: HWP) as their GHG removals or emissions. In this way, the effect of increasing carbon storage through wood products to mitigate climate change is recognized in the international rule.

Japan has been reporting CO_2 emissions and removals related to HWP since the National Greenhouse Gas Inventory Report of Japan submitted in April 2015. In the National Greenhouse Gas Inventory Document of Japan submitted in April 2024, Japan reported CO_2 emissions and removals by HWP in the following table (plus is emission, minus is absorption.).

Table 11: CO_2 emissions and removals associated with carbon stock changes in the HWP pool

Category		Unit	1990	1995	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Total		kt-CO_2	-515	1,269	1,599	503	-479	-353	-1,005	-1,171	-1,427	-1,659	-1,742	-1,669	-1,072	-2,133	-1,918
Buildings	Total	kt-CO_2	-215	-560	-22	-616	-1,109	-556	-1,088	-1,207	-1,226	-1,245	-1,449	-1,540	-1,521	-1,874	-1,793
	Sawnwood	kt-CO_2	-2	-238	457	-77	-492	411	-147	-235	-112	-101	-282	-157	-213	-524	-495
	Wooden board	kt-CO_2	-254	-371	-522	-459	-379	-480	-531	-507	-579	-566	-550	-671	-639	-689	-647
	Plywood	kt-CO_2	41	48	43	-80	-238	-487	-411	-465	-536	-578	-616	-713	-670	-660	-650
Wood used for other than building	Total	kt-CO_2	413	976	1,141	822	198	84	-18	-140	-226	-406	-474	-370	-146	-423	-358
	Sawnwood	kt-CO_2	843	1,137	1,289	1,292	1,235	1,078	1,024	961	955	925	845	776	881	717	770
	Wooden board	kt-CO_2	-411	-220	-240	-187	21	-11	5	30	31	46	67	220	232	239	237
	Plywood	kt-CO_2	-18	59	92	-283	-1,058	-983	-1,047	-1,130	-1,212	-1,377	-1,386	-1,366	-1,258	-1,379	-1,365
Paper and paperboard		kt-CO_2	-712	853	480	296	432	118	101	176	25	-7	180	241	595	165	233

Source: NIES, National Greenhouse Gas Inventory Document of Japan (April 2024).

5.c Avoided fossil fuel carbon emissions by using forest biomass for energy

Rationale:
This indicator provides information about the amount of energy produced from forest biomass and the extent to which it offsets the need to burn fossil fuels, thereby benefiting the global carbon budget and lowering carbon emissions.

Current status and trends
As of 1890, wood and charcoal accounted for 70% of the primary energy supply in Japan, but as the use of coal took off since the time of the Meiji Restoration, the ratio dropped to lower than 10% before around 1920, and their role as a major energy source became limited. In rural areas, wood in the form of charcoal and firewood was widely used as an everyday energy source before the energy revolution in the 1960s, when mainstream fuel changed from coal to oil. Since then, forest biomass has rarely been used as energy until recently.

Afterward, especially in the context of global warming, interest in the use of biomass energy as a countermeasure increased. Since the Cabinet Decision on Biomass Nippon Strategy in 2002, measures for the promotion of biomass use have been strengthened and include the Act on Promotion of Use of Organic Resources from Agriculture, Forestry and Fisheries as Raw Materials for Biofuel enacted in 2008, and the Basic Act on the Promotion of Biomass Utilization enacted in 2009. Based on the Act on Special Measures Concerning Procurement of Electricity from Renewable Energy Sources by Electricity Utilities enacted in August 2011, the feed-in tariff (FIT) scheme of renewable energy was introduced in July 2012 to oblige electricity utilities to procure electricity generated using renewable energy, including woody biomass, at a fixed price and for a fixed period of time, which has further pushed the trend. This trend has been further encouraged. Under the Feed-in Premium System (FIP scheme) introduced in 2022, procurement prices and standard prices for electricity generated from woody biomass are set for each category of woody biomass used. Under the FIT and FIP schemes, the development of power generation facilities using woody biomass is progressing in various regions. In particular, the purchase price of small-scale unused materials (From thinned wood, etc., less than 2,000 kW) is set higher than that of general wood and construction waste, and the number of certified woody biomass power generation facilities is increasing at a rapid pace.

In recent years, the amount of woody biomass used as energy has been increasing yearly due to the increase in the number of woody biomass power plants. In 2022, domestic consumption of fuel materials, including charcoal and firewood, increased 18.0% year on year to 17.36 million m^3, of which domestic production was 10.24 million m^3 (up 9.5% year on year) and imports were 7.13 million m^3 (up 32.1% year on year).

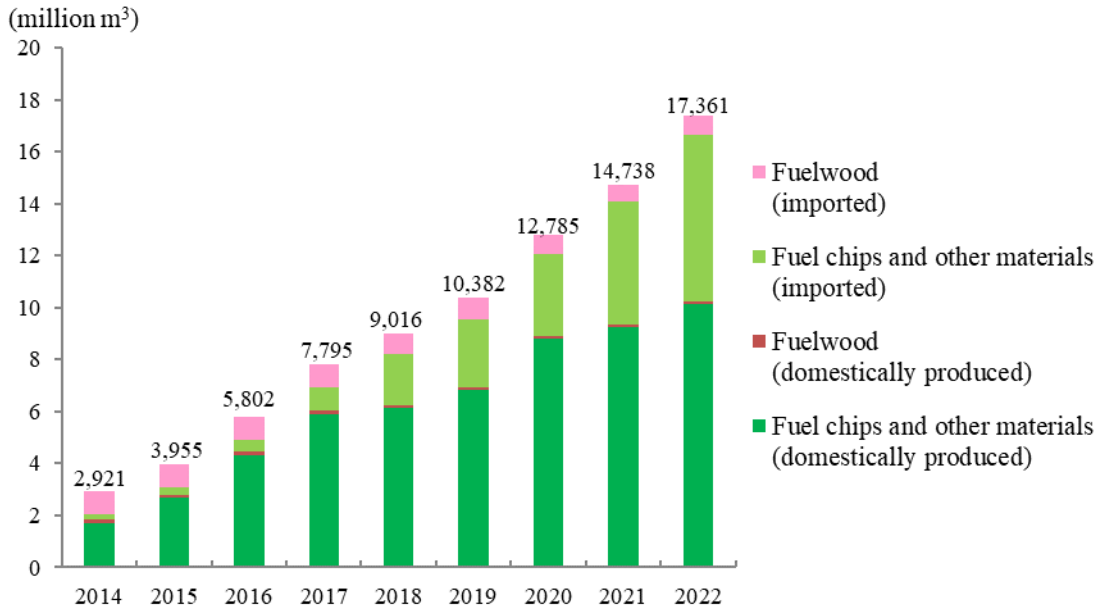


Figure 53: Changes in domestic consumption of fuel materials
Note: Fuelwood refers to wood for charcoal and firewood.
Note 2: Fuel chips refer to fuel chips and pellets.
Note 3: Figures are log equivalent values.
Source: Forest Agency, Wood Demand and Supply Chart.

Woody biomass used as an energy source includes mill ends (lumbering waste) generated in sawmills, demolished lumber/scrap wood (building-material waste) generated by demolishing buildings, and thinned wood, forest residue, etc., generated through timber production activities. According to the "Survey on Woody Biomass Energy Use Trend," the volume of wood chips used as energy in 2022 was 1.73 million tons for sawmilling residue, 3.94 million tons for construction material waste, 4.52 million tons for thinned wood and forest land residue, etc., and 870,000 tons for imported chips and other materials, totaling 11.06 million tons (absolute dry weight). In addition, 2.29 million tons of wood pellets, 50,000 tons of firewood, and 400,000 tons of wood flour were used as energy.

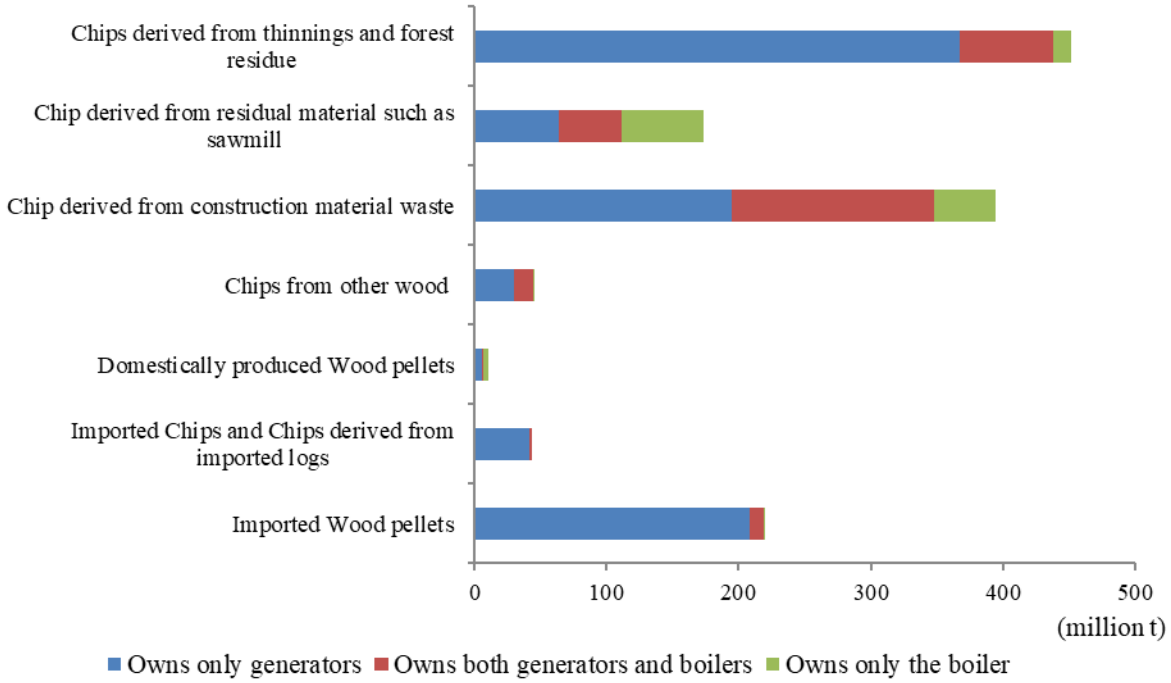


Figure 54: Amount of woody biomass used by equipment owned by business establishment with generators and boilers using woody biomass energy
Source: MAFF, Survey on Wood Biomass Energy Utilization in FY2022.

The use of thinned wood, forest scraps, etc., for energy in the form of wood chips and pellets has been increasing yearly. In 2022 it increased 10% from the previous year to 10.26 million m^3. The Third Basic Plan for Promoting Biomass Utilization which was revised in September 2022, sets a target to increase the utilization rate of forest residues from about 29% in 2019 to about 33% or more in 2030, compared with the annual generation rate of about 9.7 million tons. The utilization rate of forest residues was about 38% in 2022, against the recent increase in demand for fuel materials.

Regarding power generation facilities mainly using biomass derived from thinned wood, 55 facilities with outputs over 2,000 kw or more and 83 facilities with outputs below 2,000kw are selling electric power under the feed-in tariff (FIT) scheme for renewable energy as of September 2023. The total generation capacity is 569,056 kW.

The introduction of boilers and stoves using woody biomass as fuel is spreading in public facilities, general households, and other places. In 2022, 1,849 boilers using woody biomass were introduced across the country.

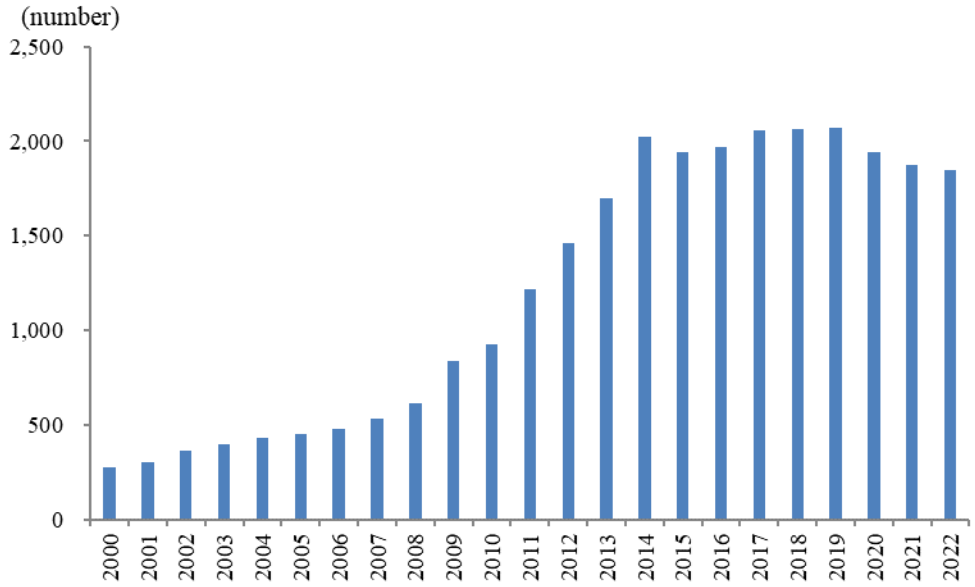


Figure 55: Changes in the number of boilers using woody biomass

Note 1: Total of number boilers using wood chips, wood pellets, etc. as fuel.

Note 2: Figures as of the end of each fiscal year up to 2014, and figures as of the end of each year from 2015.

Source: Forestry Agency (up to 2014); MAFF, Survey on Woody Biomass Energy Utilization (from 2015 onwards).

The use of wood for energy is “carbon neutral” because it does not affect the concentration of carbon dioxide in the atmosphere. Using wood that cannot be used as material in place of fossil fuel leads to the reduction of carbon dioxide emitted by fossil fuel combustion. In addition, it has been reported that, when comparing GHG emissions from raw material procurement to production and combustion, GHG emissions per unit heating value of woody biomass fuel are significantly lower than those of fossil fuel.

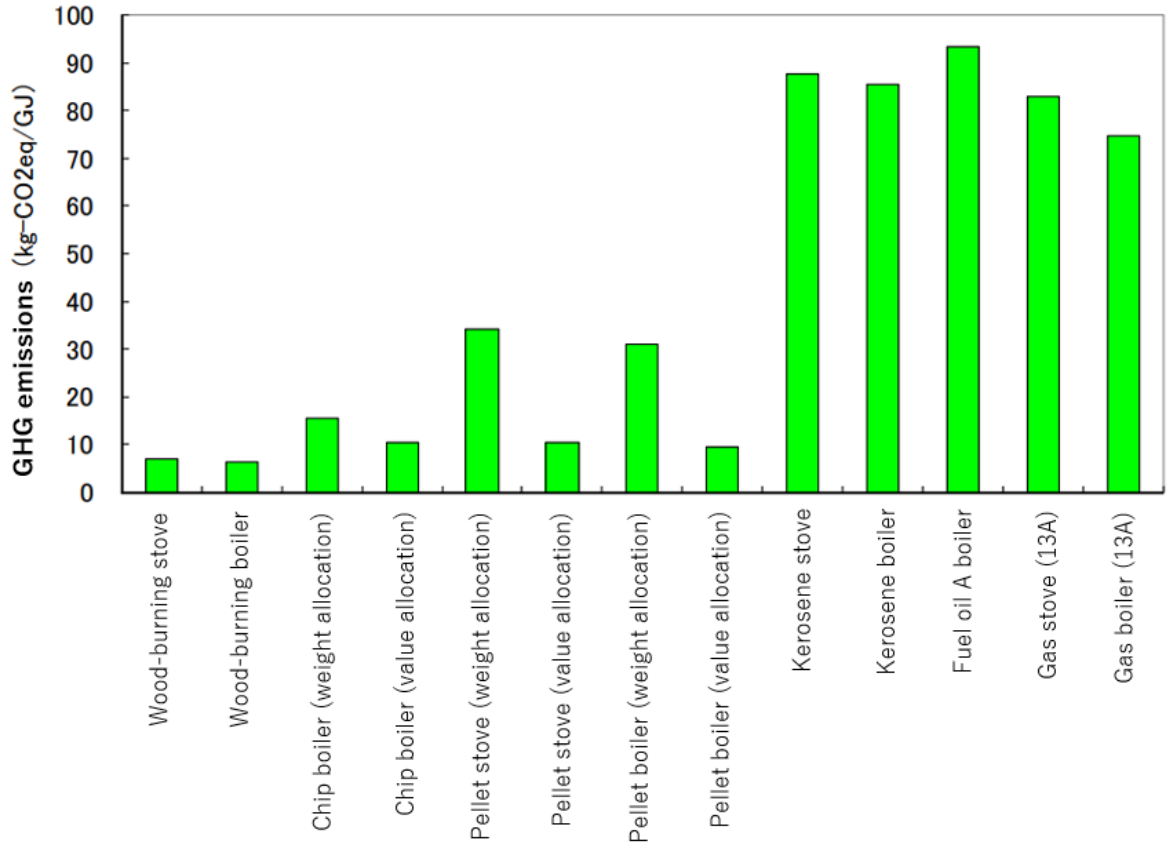


Figure 56: Comparison of GHG emissions by fuel type

Note: Carbon dioxide emissions at all stages from raw material procurement to production and combustion per unit heating value of each fuel when it is burned with dedicated heat utilization equipment.

Source: Forest Energy Research Institute, Inc., Report on Woody Biomass LCA Assessment.

Criterion 6: Maintenance and enhancement of long-term multiple socio-economic benefits to meet the needs of societies

Forests provide a wide variety of social, cultural and economic goods, services and other benefits that contribute to meeting the needs of society. Many people and communities, including indigenous peoples, are dependent on forests for their livelihood and well-being. Information on the production and consumption of forest products, investment and employment in the forest sector, forest-based recreation and tourism, and other social and cultural forest values illustrate the many benefits forests provide.

6.1 Production and consumption

These indicators provide information on the contribution of wood and non-wood products and environmental services to national economies. The value, volume and revenues associated with domestic production and consumption of forest products and services, including through international trade, demonstrates the type and magnitude of the contribution of forests to domestic economies. They also provide information about market conditions relevant to forest management and the forest sector.

6.1.a Value and volume of wood and wood products production, including primary and secondary processing

Rationale:
This indicator provides information on the value and volume of wood and wood products at various processing stages. The value and volume of wood and wood products reflects one aspect of the importance of forests and the wood processing sector to domestic economies.

Current status and trends
Forestry in Japan has long been in difficult situations, with falling wood prices. However, in recent years it has been regaining its vitality with the increase in the production of domestic wood. The amount of wood production has risen in recent years due to new demand for wood.

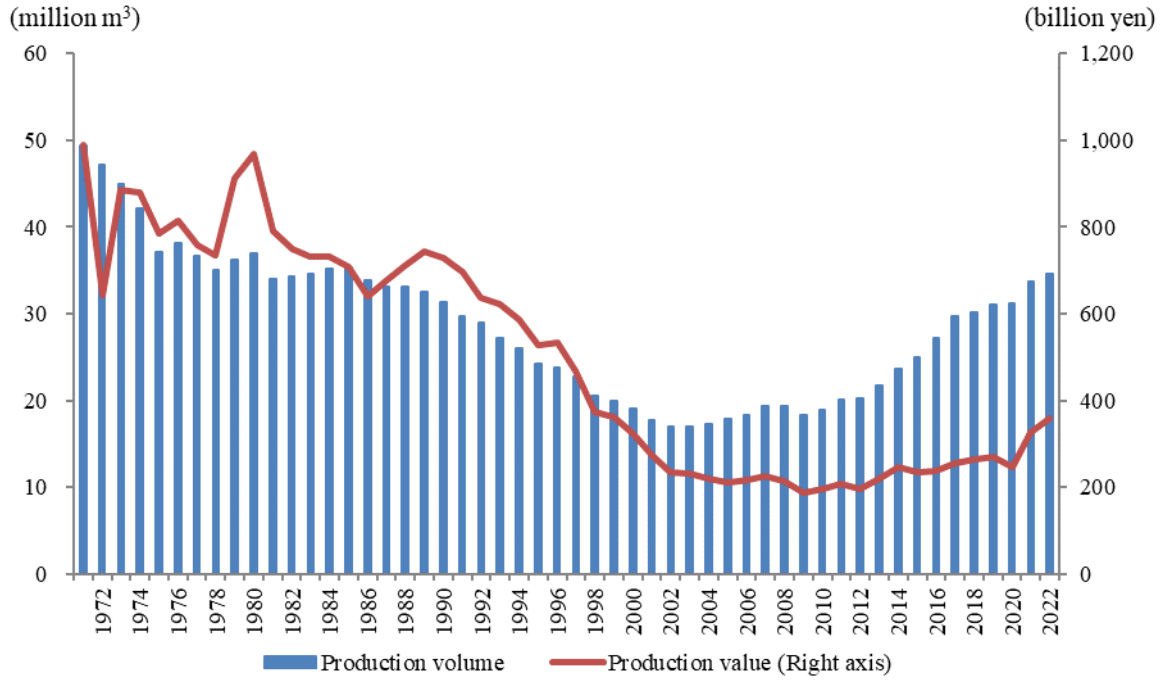


Figure 57: Changes in production volume and value of domestic logs
Source: The figures for timber production are from Forestry Agency, Wood Supply and Demand Chart; the figures for timber production value are from MAFF, Production Forestry Income Statistical Report (up to 2014); MAFF, Forestry Output (from 2015 onwards).

The value of shipments of lumber and wood product manufacturing industry had long been on a long-term downward trend since 1990 until around 2005. After a significant decline in 2009 due to the impact of the Lehman shock, they have been on a recovery trend since then. In 2021, due to factors such as increased demand for wood in the U.S. as a result of increased housing starts, and disruptions in marine transportation, there was a shortage of imported wood in Japan, and prices soared. As a result, demand for domestic wood as an alternative increased, and the price of domestic wood products also rose. The value of manufactured lumber and wood products shipments in 2022 was 3,753.8 billion yen. The breakdown is as follows: 887.6 billion yen (about 24% of the total) by lumber manufacturing, 265.5 billion yen (about 7% of the total) by laminated wood manufacturing, 524.7 billion yen (about 14% of the total) by plywood and veneer manufacturing, and 148.5 ~~94~~ billion yen (about 4% of the total) by wood chip manufacturing.

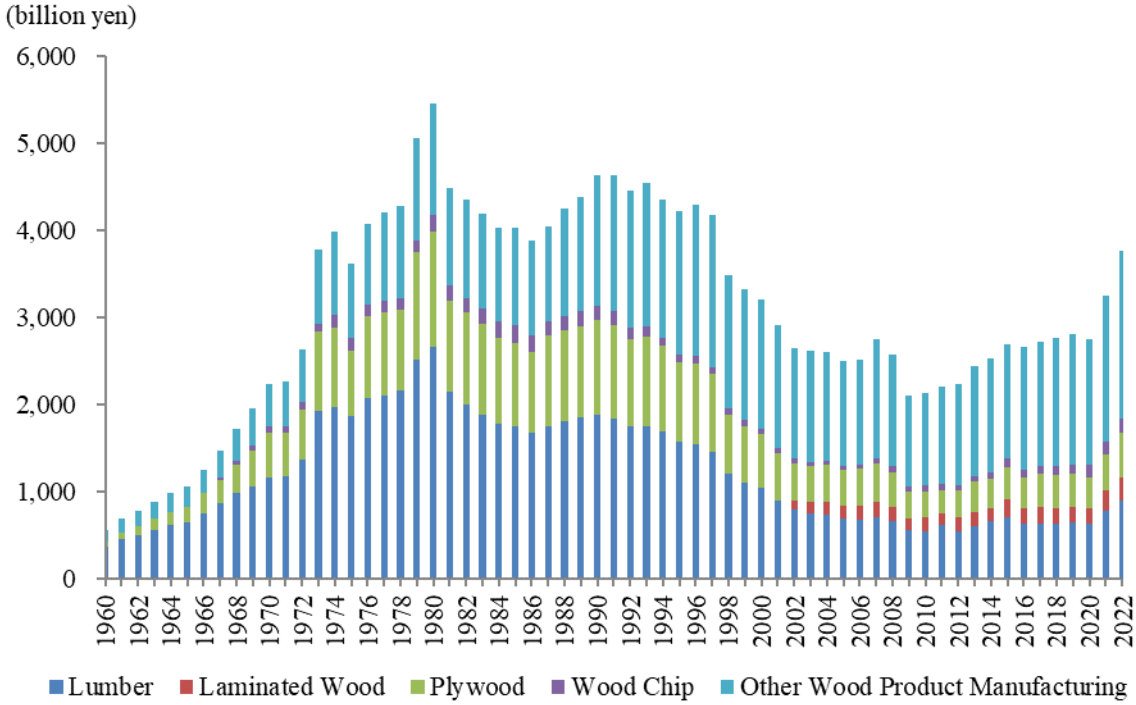


Figure 58: Changes in shipments of products in the wood and wood products manufacturing industry
Source: METI, Census of Manufacture; MIC and METI, Economic Census for Business Activity; MIC and METI, Annual Business Survey.

Shipments of lumber products were on a declining trend until 2009 and then leveled off to 8.6 million m^3 in 2022. The breakdown of lumber shipments by use was 6.96 million m^3 (81% of the total shipment) for construction materials, 0.38 million m^3 (4% of total shipments) for civil engineering construction materials, 1.03 million m^3 (12% of total shipments) for wooden boxes/packing materials, 0.05 million m^3 (1% of total shipments) for furniture/fixtures, and 0.18 million m^3 (2% of total shipments) for other use.

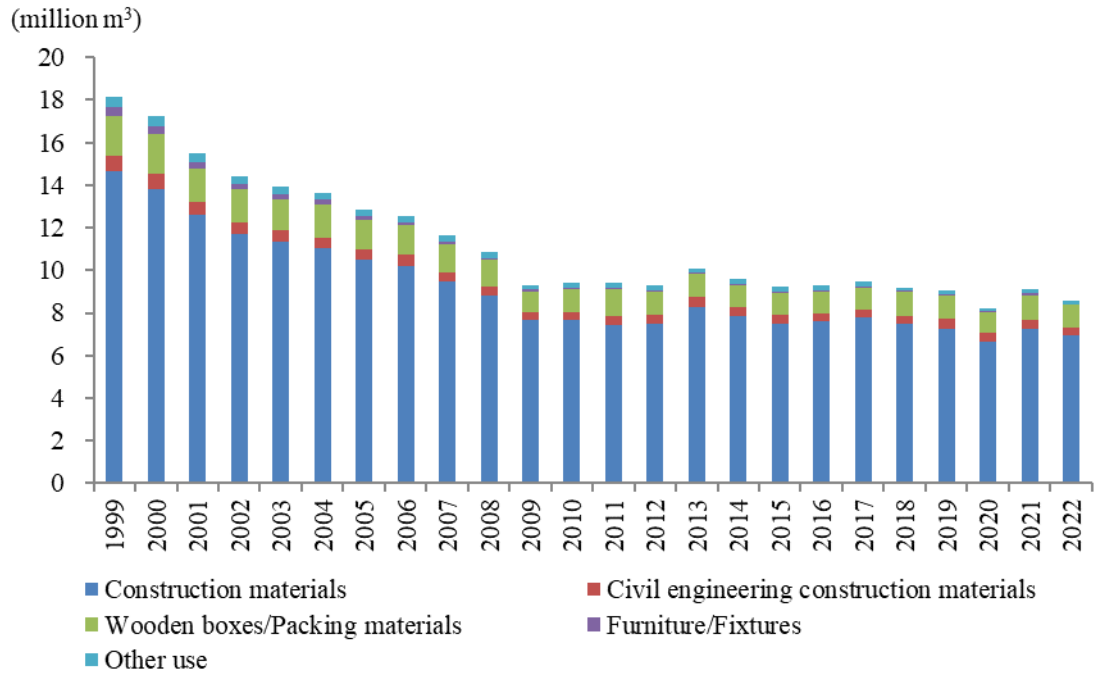


Figure 59: Changes in lumber shipment by use
Source: MAFF, Wood Supply and Demand Report.

The production of laminated wood using domestic or imported lumber increased until 2006 and fluctuated between approximately 1.3 million m^3 and 1.9 million m^3 from 2007 onward. In 2022, the figure was 1.66 million m^3. The volume of imported laminated wood products in 2022 was 1.04 million m^3, accounting for 39% of the total supply of laminated wood.

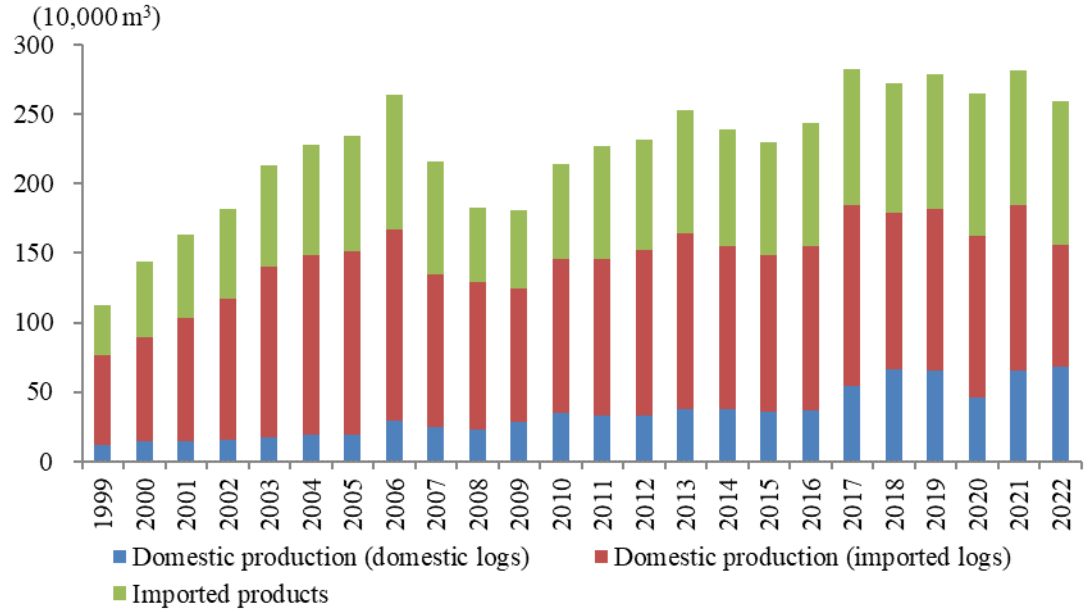


Figure 60: Changes in supply of laminated wood
Source: Surveyed by the Japan Laminated Wood Products Association (up to 2016); MAFF, Wood Supply and Demand Report (from 2017 onwards).

In recent years, the production volume of plywood has been around 3 million m^3 for normal plywood and around 0.5 million m^3 for special plywood .

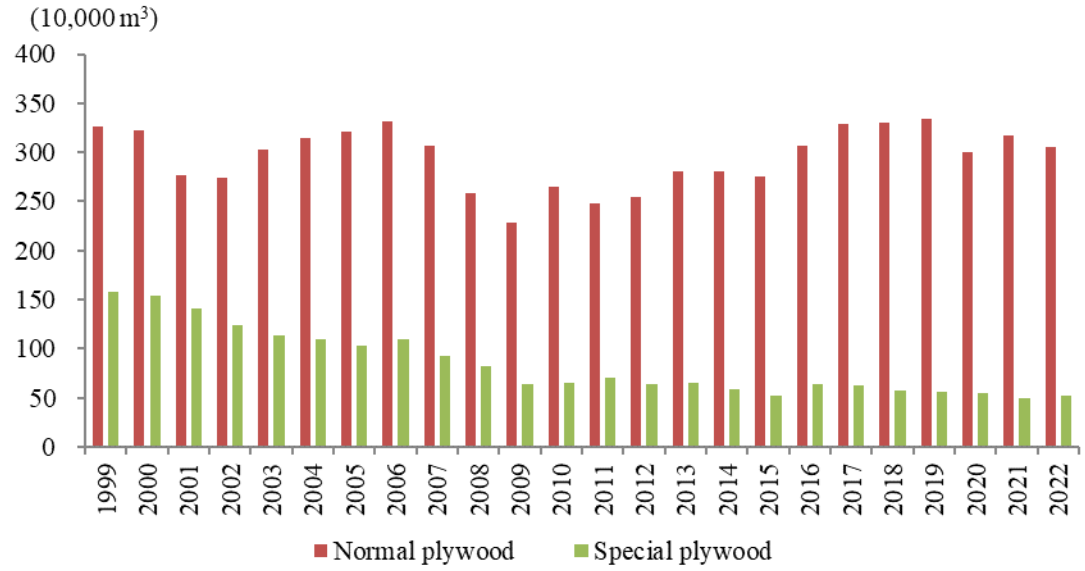


Figure 61: Changes in plywood production volume
Source: MAFF, Wood Demand and Supply Report.

Wood chips' production volume has been generally between 5 million and 6 million tons since 2010. In 2022, production decreased from 2021 to 5.28 million tons. Production volume by raw material is: 2.38 million

tons (or 45% of total production) from logs, 2.16 million tons (41%) from factory residue, 0.05 million tons (1%) from logging residue, and 0.70 million tons (13%) from demolition waste/scrap wood.

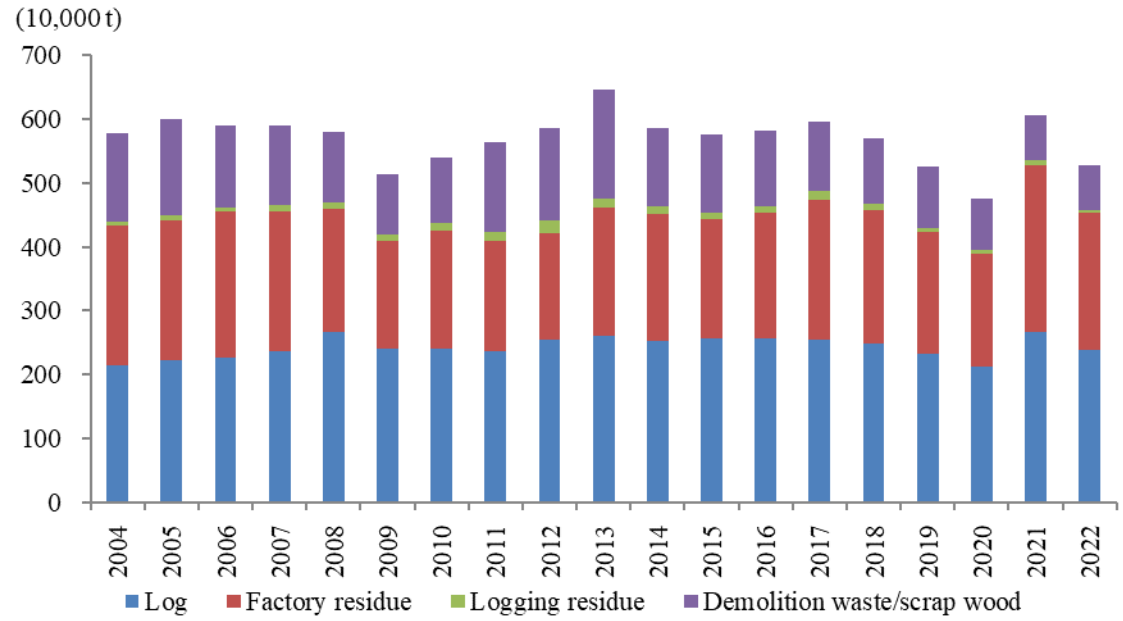


Figure 62: Changes in wood chip production volume by raw material
Source: MAFF, Wood Demand and Supply Report.

The production volume of paper and paperboard in Japan remained at around 30 million tons from the beginning of the 2000s until 2008, but it decreased after 2009. In 2022, it was 23.66 million tons.

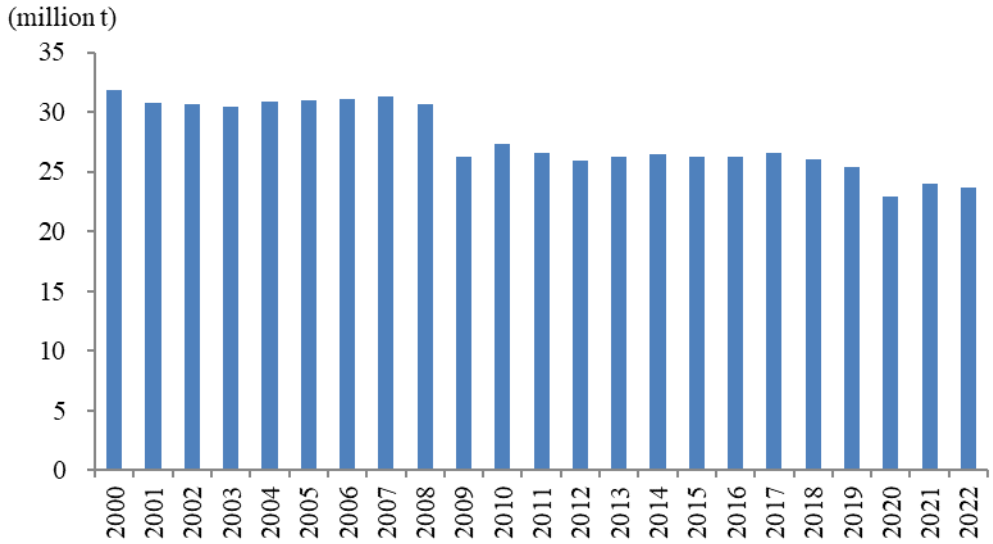


Figure 63: Changes in paper and paperboard production volume
Source: METI, Yearbook of Paper and Pulp Statistics (up to 2001); METI, Yearbook of Paper, Pulp, Plastics Products, and Rubber Products Statistics (from 2002 to 2012); METI, Current Production Statistics Survey (Paper, Printing, Plastic and Rubber Products Statistics) (from 2013 onwards).

6.1.b Value of non-wood forest products produced or collected

Rationale:
This indicator provides information on the value of non-wood forest products. The collection, processing and use of non-wood forest products are important dimensions of the economic value of forests. In some countries, non-wood forest products are vital to the livelihoods and lifestyles of indigenous and other rural communities.

Current status and trends
In Japan, most NWFPs are classified as NTFPs. The production value of these products has been around 200 to 250 billion yen since the mid-1980s. Of this, cultivated mushrooms, which account for over 90%, were previously cultivated mainly on logs inoculated with seed fungus on the forest floor, but thanks to the development and spread of cultivation technology, around 20 mushroom species are now cultivated artificially mainly in facilities outside the forest, and are available at any time. Mushrooms have low calorie content but are rich in fiber, B-complex vitamins, Vitamin D, and other nutrients. Effects to strengthen the immune system, lower blood cholesterol level and blood pressure, and other contributions to health are also expected.

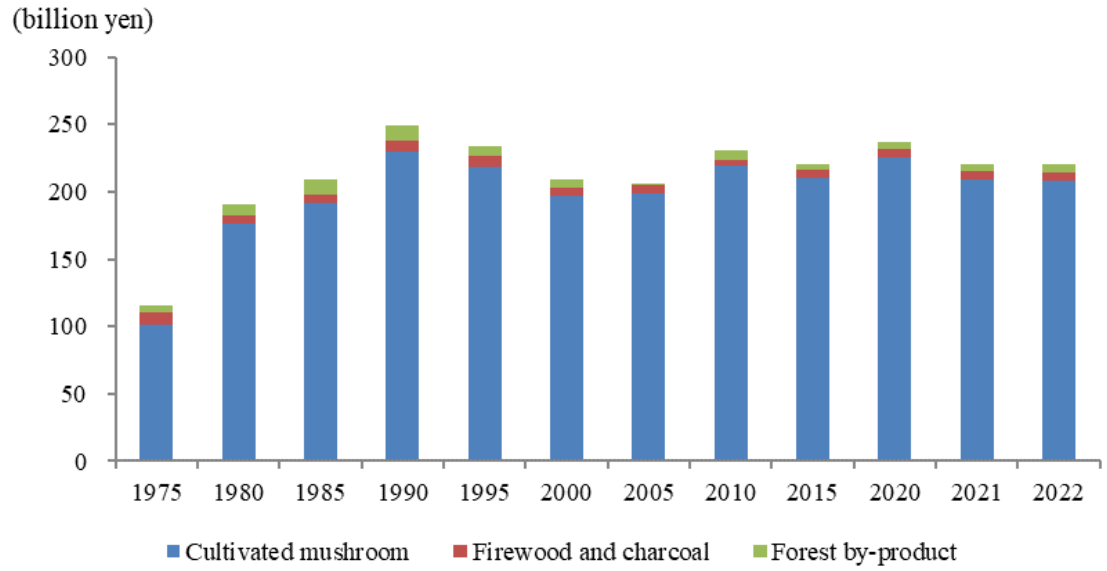


Figure 64: Changes in output of NTFPs
Note 1: The figure for firewood and charcoal production from 2005 onwards includes bamboo charcoal and powdered charcoal.
Note 2: The figure for forest by-products from 2005 onwards includes the production value of Japan wax and raw Japanese lacquer, and from 2010 onwards include the production value of wild grass, and from 2020 onwards include the production values of wild birds and mammals.
Source: MAFF, Forestry Output.

According to the result of The Survey on the Utilization of Wildlife Resources, 108,892 sika deer (5,443 tons) and 36,087 wild boars (1,425 tons) were sent to meat processing facilities in 2022. Meat processing facilities purchase wildlife, process them into game meat and sell, or only undertake butchering and deliver the meat, to clients. Average purchase prices are 357 yen/kg for sika deer and 752 yen/kg for wild boar, while the average butchering fee is 412 yen/kg for sika deer and 471 yen/kg for wild boar.

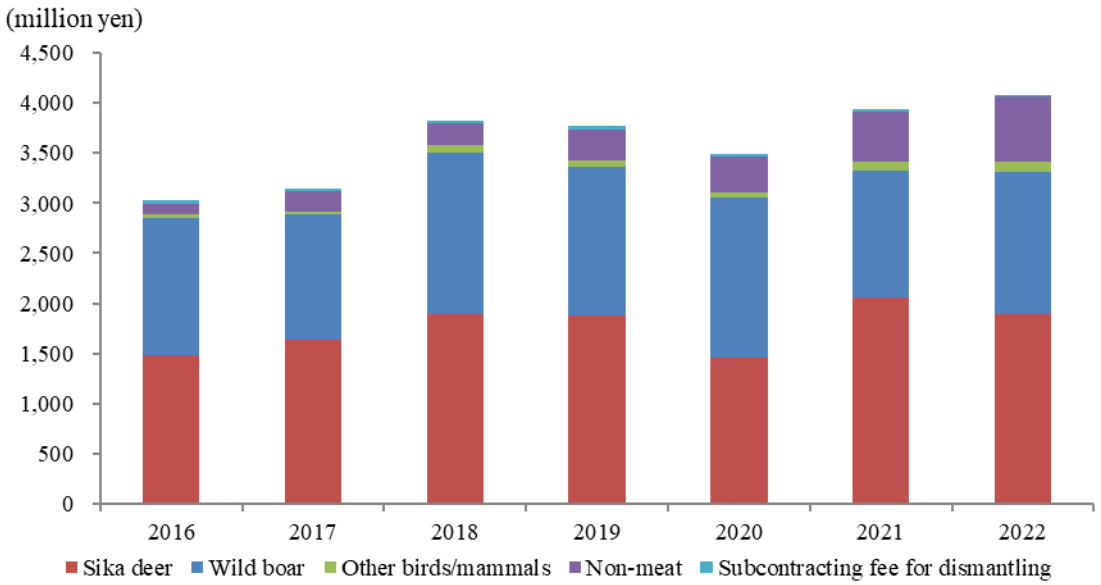


Figure 65: Amounts obtained from processing at meat processing facilities
Source: MAFF, Survey on the State of Utilization of Wildlife Resources.

6.1.c Revenue from forest-based ecosystem services

Rationale

This indicator provides information about forest-based ecosystem services for which markets and revenues are emerging or currently exist. Revenues from forest-based ecosystem services can be an important component of the economic value of forests.

Current status and trends

The Millennium Ecosystem Assessment led by the United Nations classifies ecosystem services into four categories: provisioning services, regulating services, cultural services, and supporting services. Forests provide many of these ecosystem services. Specific examples of provisioning services are mushrooms, wild edible plants, and other food; drinking and irrigation water; raw materials, including lumber, fuel, and minerals; genetic and medicinal resources; and appreciation resources, including materials for crafts. Examples of regulating services include climate regulation, disaster mitigation, water quality purification, and pollination. Furthermore, forests provide cultural services, including opportunities for recreation and sightseeing, cultural/artistic inspiration, and knowledge related to science and education. Supporting services include the provision of wild habitats.

Since there is a wide variety of economic activities, and transactions of products and service industries which are drawing income directly or derivatively from these services, it is difficult to assess the income size quantitatively. Progress of relevant research is desirable.

Since FY2013, the government of Japan certified the amount of greenhouse gas emissions (e.g., CO_2) reduced or removed by sinks through efforts to introduce energy-saving devices, use of renewable energy, and manage forests as "credit" under Japan Greenhouse Gas Emission Reduction/Removal Certification Scheme (i.e., J-Credit scheme). For the forest sector, three methodologies are defined: forest management, afforestation, and reforestation activities. Project implementers can carry out projects that have been registered following validation, and by receiving certification for the amount of forest absorption based on monitoring results as credits, they can trade them with emitting businesses such as companies and organizations and obtain funds for further promotion of forest development. The total amount of certified forest absorption J-credits by the end of FY2023 was 626,000 CO_2 tons, of which 448,000 CO_2 tons were certified in FY2023, showing a significant upward trend in the amount of forest absorption J-credits created.

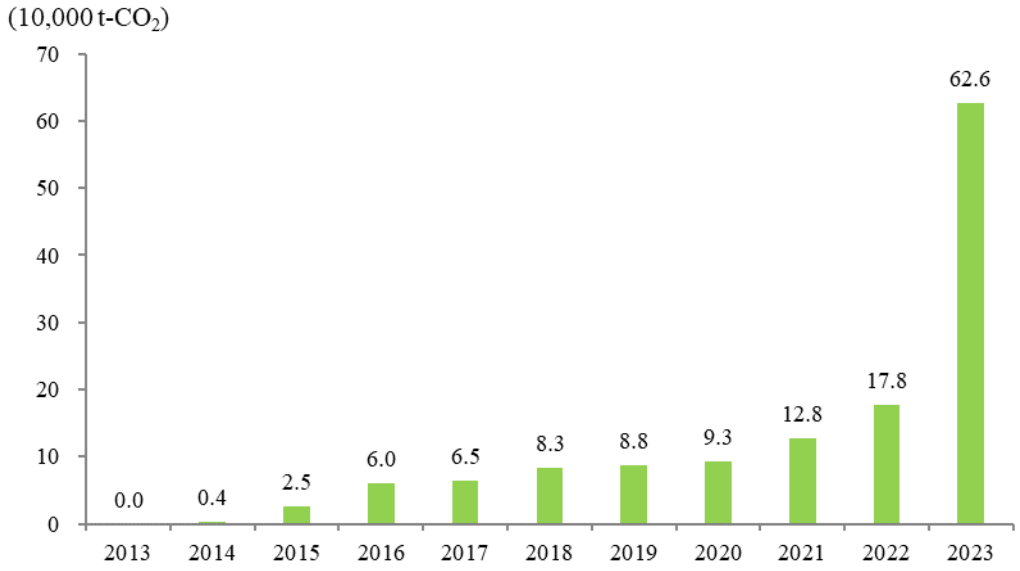


Figure 66: Changes in the credit certification volume for forest management projects
Source: Forestry Agency.

In addition, Japan is promoting the “forest-related service industry,” which utilizes rich forest spaces to provide experience programs in various fields such as health, tourism, and education.

As of the end of 2024, 55 regions promote the “forest-related service industry” and offer programs such as “forest bathing,” or “shinrin-yoku” in Japanese.

From upper left: Kaminoyama City area, Yamagata Prefecture (©2020); Ritto City area, Shiga Prefecture (provided by Ritto City Tourism Association); Shinano-machi area, Nagano Prefecture
From lower left: Ina City, Nagano Prefecture; Odawara City, Kanagawa Prefecture; and Naganohara

Figure 67: Experiential programs in “forest-related service industry” promotion areas
Source: Forestry Agency.

6.1.d Total and per capita consumption of wood and wood products in round wood equivalents

Rationale

This indicator provides information on consumption, including consumption per capita, of wood and wood products. The quantity of wood and wood products consumed illustrates one aspect of society's dependence on forests as a source of raw materials.

Current status and trends

About 82 million m^3 of wood and wood products in round wood equivalent was consumed in Japan in 2022. Due to the impact of the Lehman Shock, total consumption of wood and wood products fell to 64 million m^3 in 2009. It was the first time in 49 years since 1960 that consumption fell below the 70 million m^3 level. Since then, consumption has been between approximately 70 million and 80 million m^3.

As is the case with total consumption, the consumption of wood and wood products per capita dropped to a minimum of 0.5 m^3 in 2009 and has been between approximately 0.6 m^3 and 0.7 m^3 since then.

The consumption of wood and wood products is closely related to new housing starts. In 2022, there were about 0.86 million new housing starts, of which about 0.48 million, or 55%, were wooden houses.

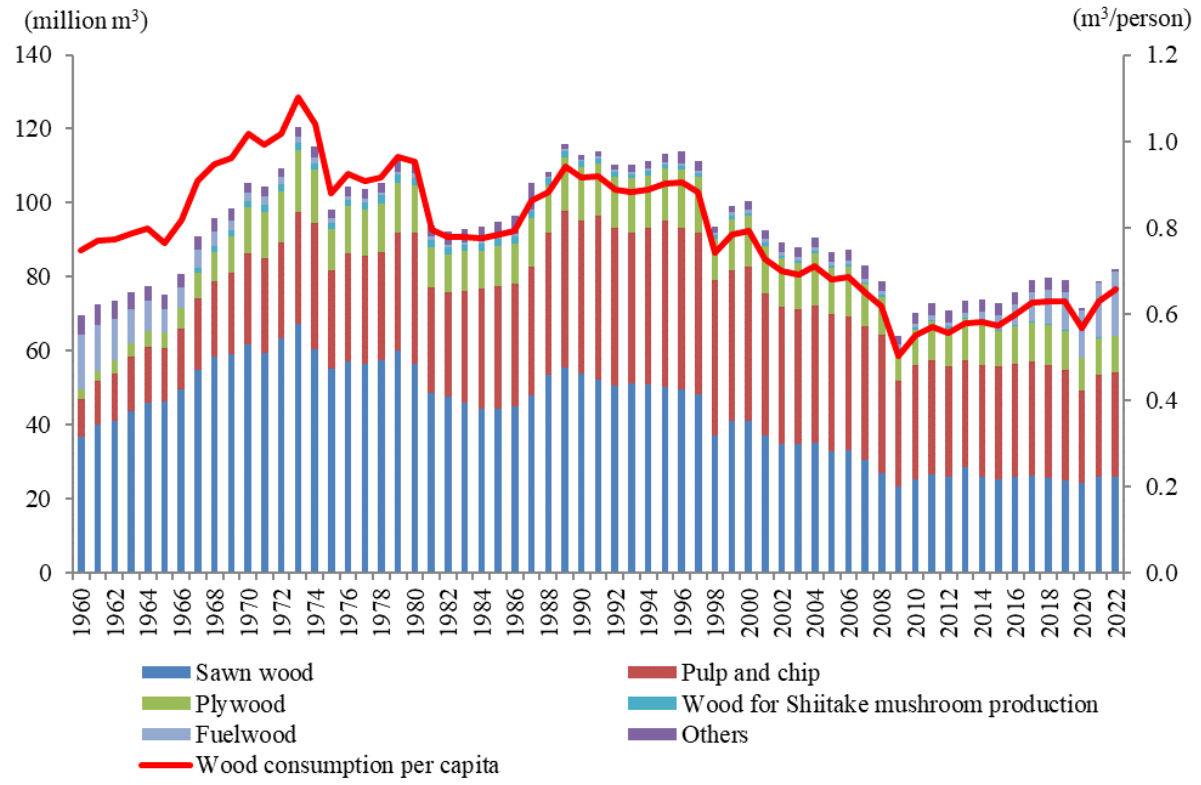


Figure 68: Changes in total and per capita consumption of wood and wood products

Source: Forestry Agency, Wood Demand and Supply Chart; MIC, Annual Report Population Estimates.

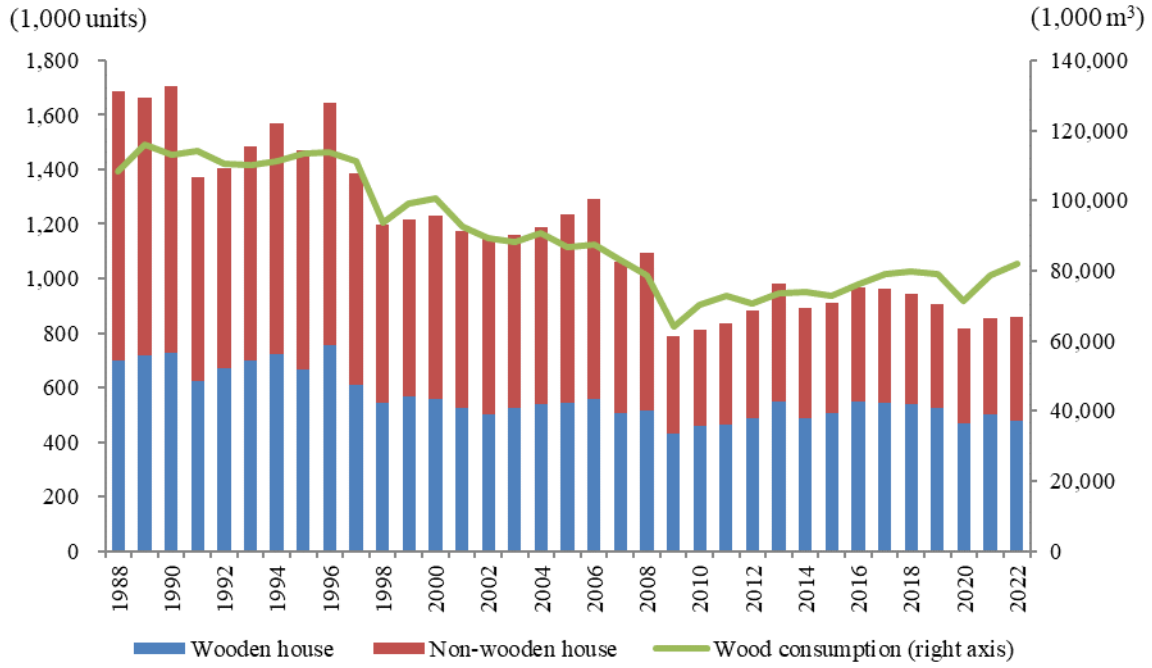


Figure 69: Changes in total wood consumption and the number of new housing starts
Source: Forestry Agency, Wood Demand and Supply Chart; MLIT, Housing Starts.

As the number of new housing starts expected to decrease in Japan in the future, the expansion of wood use in non-residential and mid- to high-rise building sectors has become a challenge. Against this backdrop, recent years, there has been a trend to use wood for public facilities, such as schools and libraries, as well as for shopping malls, convenience stores, and other commercial facilities and offices. In addition, various efforts are being made to increase the demand for wood, including expanding wood use in the civil engineering sector and using woody biomass energy.

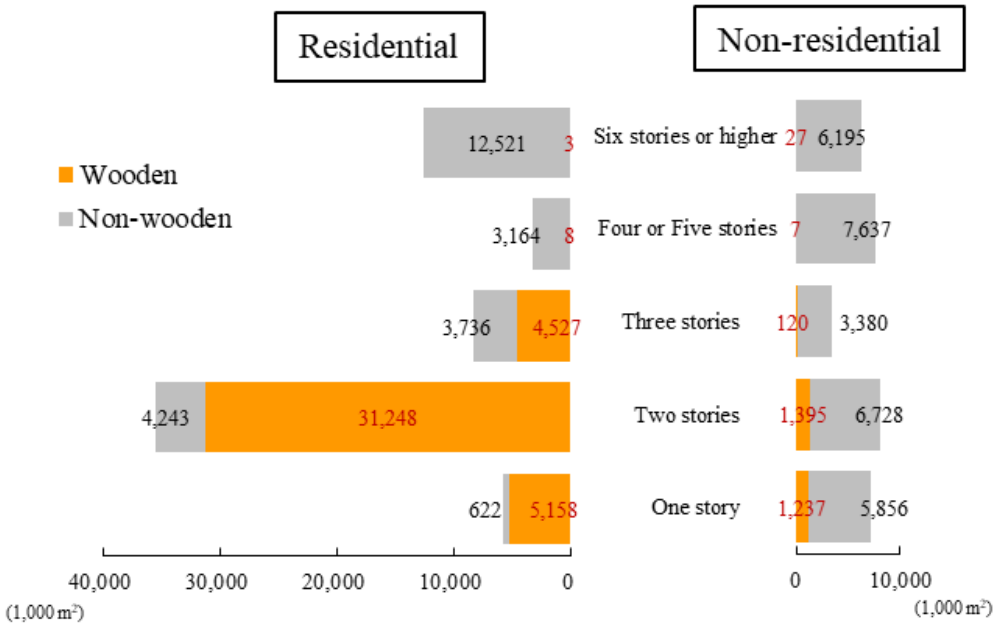


Figure 70: Floor area of residential and non-residential housing starts by type of structure and number of stories
Source: Prepared by Forestry Agency based on MLTI, Building Starts (2023).

6.1.e Total and per capita consumption of non-wood forest products

Rationale
This indicator provides information on the consumption of non- wood forest products. The quantity of non-wood products consumed illustrates society's dependence on forests as a source of these products.

Current status and trends
Since 2000, more than 0.5 million tons of edible mushrooms, equivalent to over 3 kg per capita, have been consumed yearly in Japan. In recent years, most of the mushrooms consumed have been grown in facilities outside of forests, and the consumption of dried shiitake mushrooms, which are primarily grown in forests, has been declining.

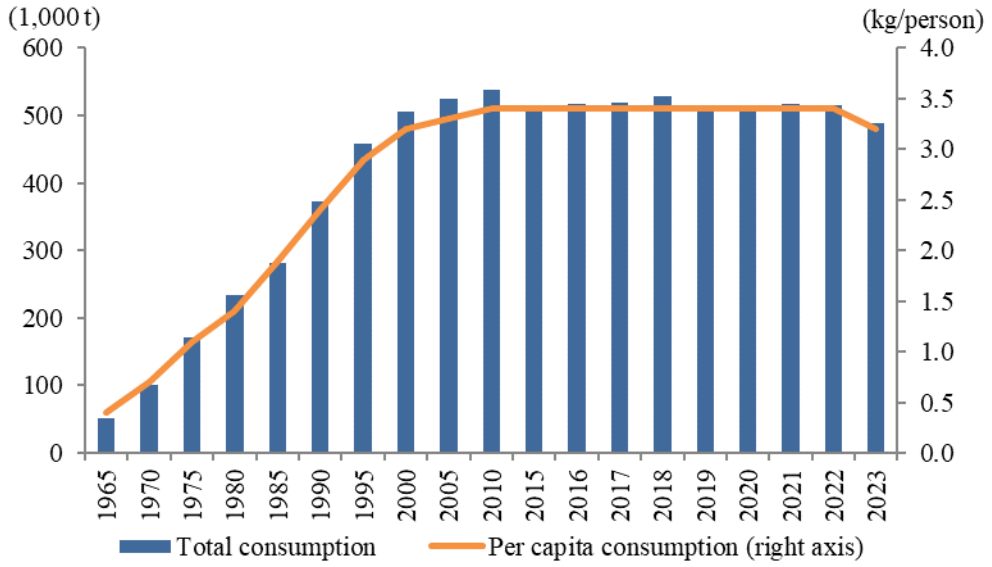


Figure 71: Changes in total and per capita consumption of edible mushrooms
Source: MAFF, Food Balance Sheet.

Other than mushrooms, edible tree fruits, and wild vegetables, Japan wax, Japanese lacquer, camellia oil, and other various NTFPs are consumed. However, their consumption has undergone many changes along with changing lifestyles. The consumption of Japanese lacquer, for example, considerably declined from 329 tons in 1985 to 30 tons in 2023.

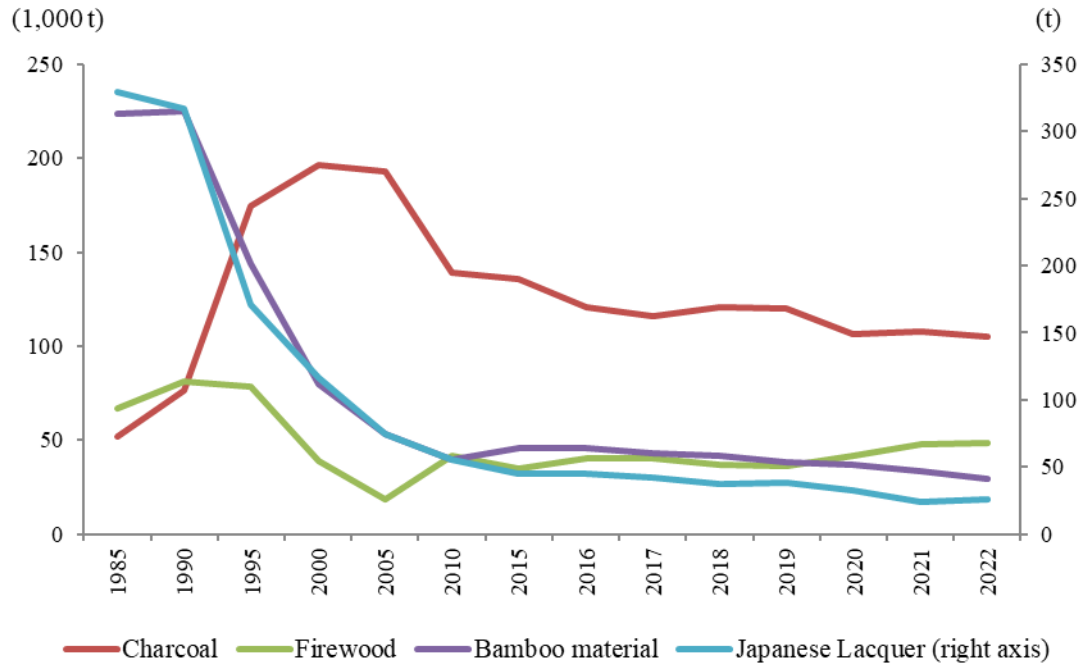


Figure 72: Changes in total consumption of non-edible NTFPs
Note: Charcoal includes white, black, powdered, bamboo, and sawdust charcoals.
Source: MAFF, Non-timber Forest Products Data.

6.1.f Value and volume in round wood equivalents of exports and imports of wood products

Rationale:
This indicator provides information about the value and volume of a country's exports and imports in wood products and their contribution to the domestic economy. International trade in wood products may be a significant factor in the management, commercial use and economic value of forests.

Current status and trends
The volume of timber imported to Japan peaked in 1996 at about 90 million m^3 (log equivalent) and has been on a downward trend since then, reaching about 50 million m^3 in 2022.

In 2020, due to the impact of COVID-19, rising demand of wood in the United States, and disruptions in maritime transportation, Japan's sawn timber imports remained below the same month in the previous year until the first half of 2021, and the average unit price of sawn timber imports increased significantly.

Regarding wood and wood products, the form of wood imports has been shifting from round wood to products, and log imports account for about 10% of the total wood imports. In recent years, the volume of imports in fuelwood has been increasing. The import value is around one trillion yen, with significant yearly fluctuations.

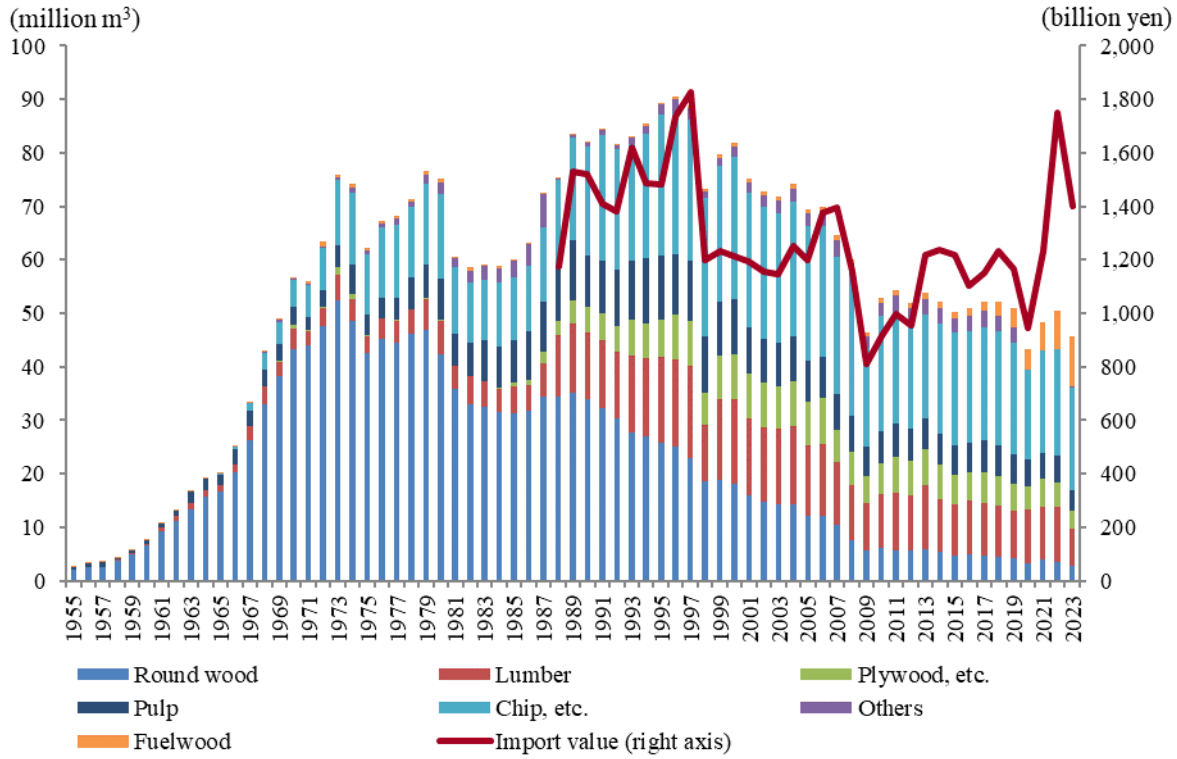


Figure 73: Changes in import value and volume of wood and wood products
Note 1: Fuelwood includes charcoal, firewood, fuel chips, and pellets.
Note 2: The figures for import value are a total of statistical codes of HS44.
Source: The figures for import volume of wood and wood products are from Forestry Agency, Wood Supply and Demand Chart; the figures for import value are from MOF, Trade Statistics of Japan.

Japan's wood exports had been around 10 billion yen in recent years but have rapidly increased since 2013 due to increased wood demand in China and improved recognition of Japanese wood. The export value reached 50.5 billion yen in 2023.

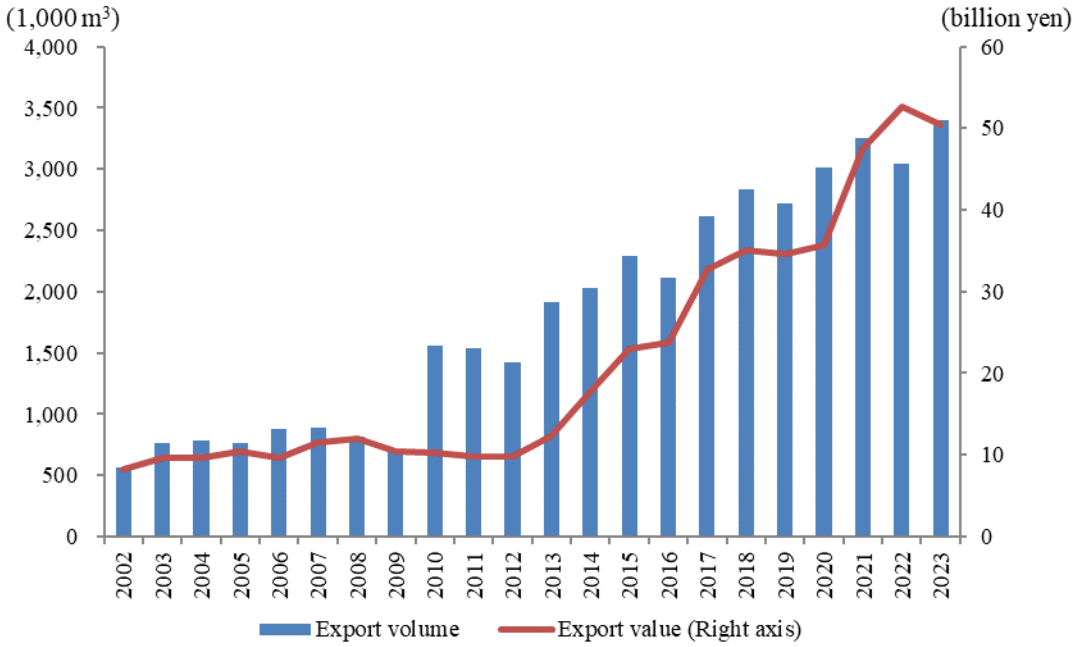


Figure 74: Changes in export value and volume of wood and wood products from Japan

Note: The figures for export value are a total of statistical codes of HS44.

Source: The figures for export volume of wood and wood products are from Forestry Agency, Wood Supply and Demand Chart; the figures for export value are from MOF, Trade Statistics of Japan.

6.1.g Value of exports and imports of non-wood forest products

Rationale

This indicator provides information about the value of a country's exports and imports of non-wood products and their contribution to the domestic economy. International trade in non-wood products may be a significant factor in the management, commercial use and economic value of forests.

Current status and trends

The total import value of NTFPs into Japan was about 44 billion yen in 2023. The import value of bamboo shoots increased in recent years, reaching about 18 billion yen, while the import value of mushrooms remained unchanged reaching at about 14 billion yen.

The value of charcoal imports fell from 2019 to 2021 but has increased since then. Major exporters are Laos, Indonesia, and the Philippines, accounting for 60% of the total value. The advantages of charcoal include its ability to be used without a power source, for both cooking and heating, its slight smoke, and its extended storage. It can also be used as fuel in times of disaster. For these reasons, the charcoal industry is working to increase demand for charcoal as fuel through the publication of uses of charcoal and the spread of charcoal cookers for household use, for example. As charcoal is porous and, therefore, a sound absorbent, it is also used as soil conditioner, water purification, and humidity regulator, etc.

In contrast, the NTFPs' export value is small compared with its import amount, which is around one billion Japanese yen annually.

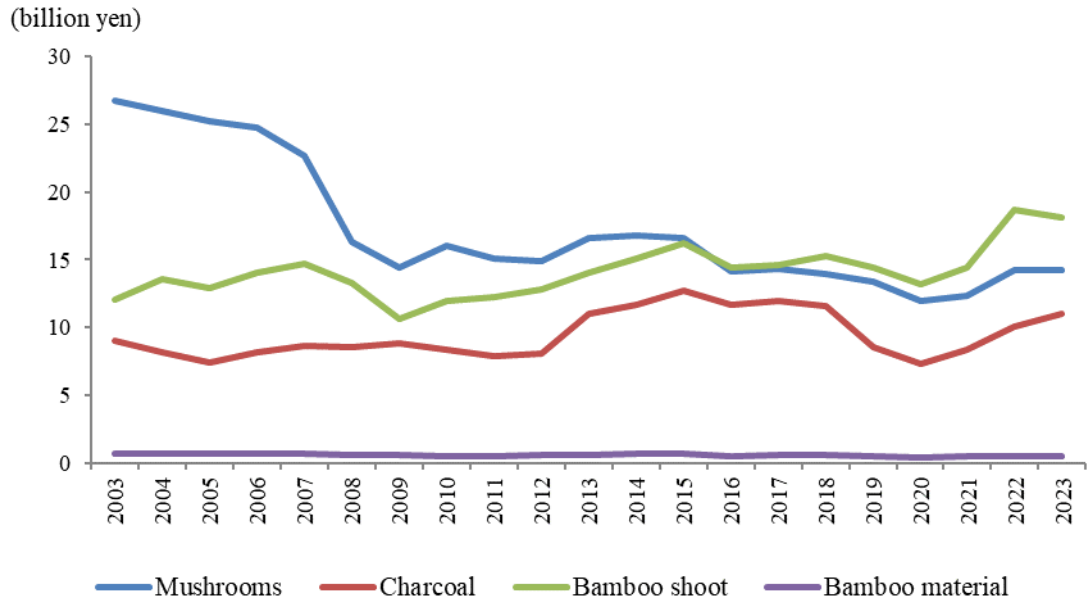


Figure 75: Changes in import value of NTFPs

Note: Mushrooms includes statistical codes of 0709.55-000, 0709.59-000, 0712.32-000, 0712.33-000 and 0712.34-000. Charcoal includes statistical codes of 4402.900200, 4402.90-300 and 4402.20-010. Bamboo shoot includes statistical codes of 2004.90-220, 2005.91-100 and 2005.91-900. Bamboo material includes statistics of 1401.10-000.

Source: MOF, Trade Statistics of Japan.

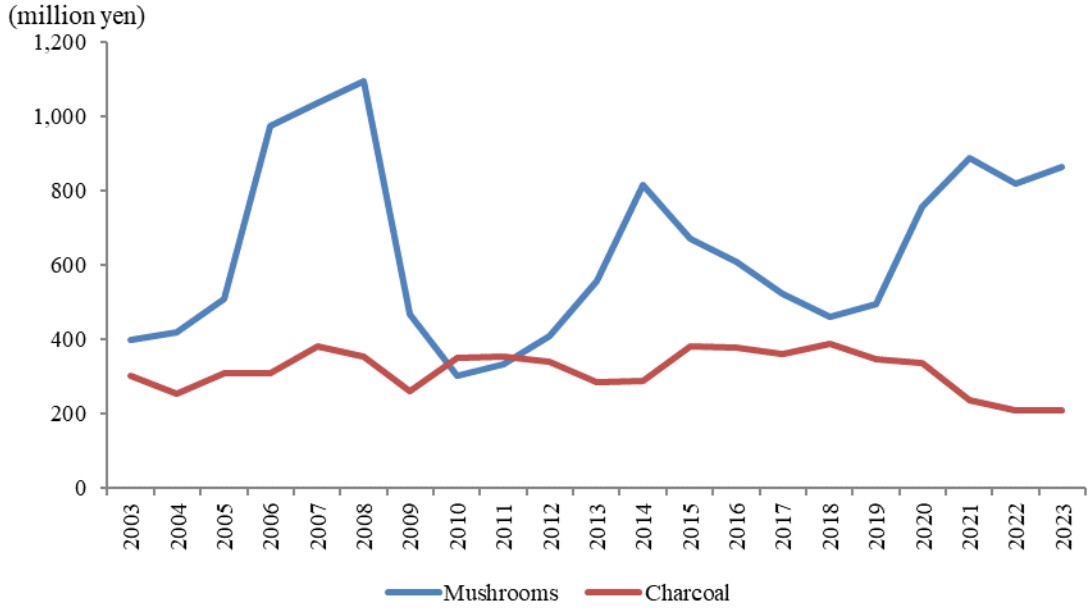


Figure 76: Changes in export value of NTFPs

Note: Mushrooms includes statistical codes of 0709.59-000 and 0712.34-000. Charcoal includes statistical codes of 4402.10-000, 4402.20-000 and 4402.90-000.

Source: MOF, Trade Statistics of Japan.

6.1.h Exports as a share of wood and wood products production and imports as a share of wood and wood products consumption

Rationale

This indicator provides information on the relative importance of international trade in wood and wood products to domestic production and consumption. Wood and wood product exports can be a significant source of revenue for domestic economies. Imports may supplement or substitute for production from domestic forest sources.

Current status and trends

In 2022, imported wood and wood products accounted for about 60% of the total volume of consumption in Japan in round wood equivalents. The share of imported wood has been decreasing in recent years.

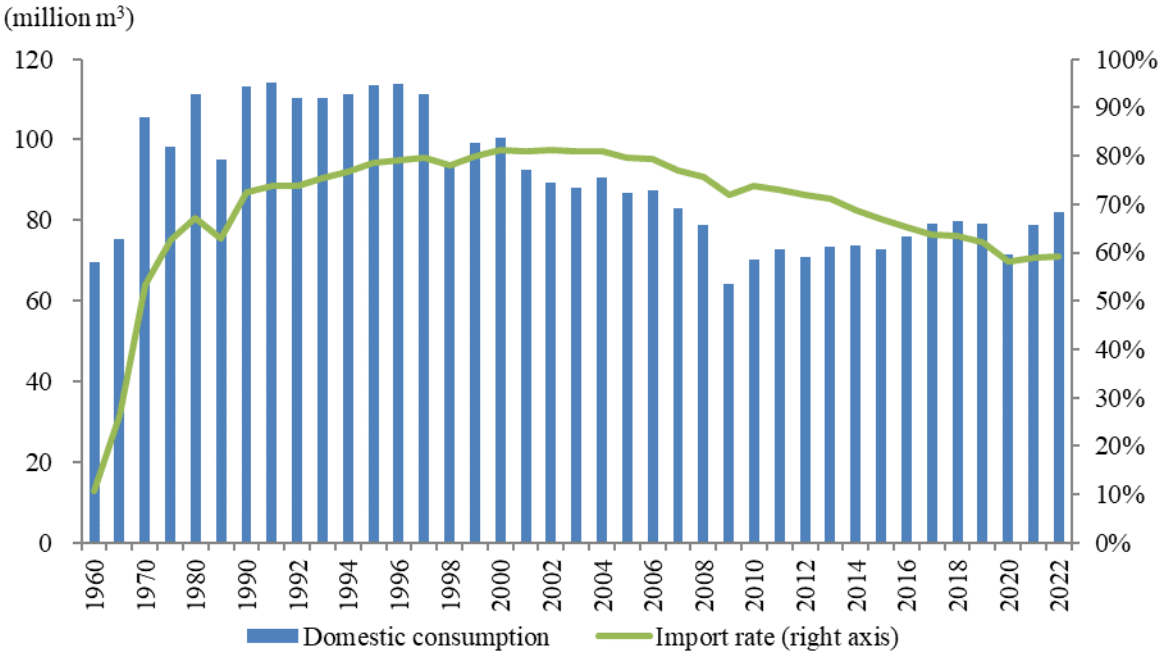


Figure 77: Changes in the ratio of import volume to total consumption of wood and wood products
Source: Forestry Agency, Wood Supply and Demand Chart.

In contrast, the share of exports in gross domestic production was under 1% up to the first half of the 1990s but has been increasing since then, reaching 8.8% in 2022.

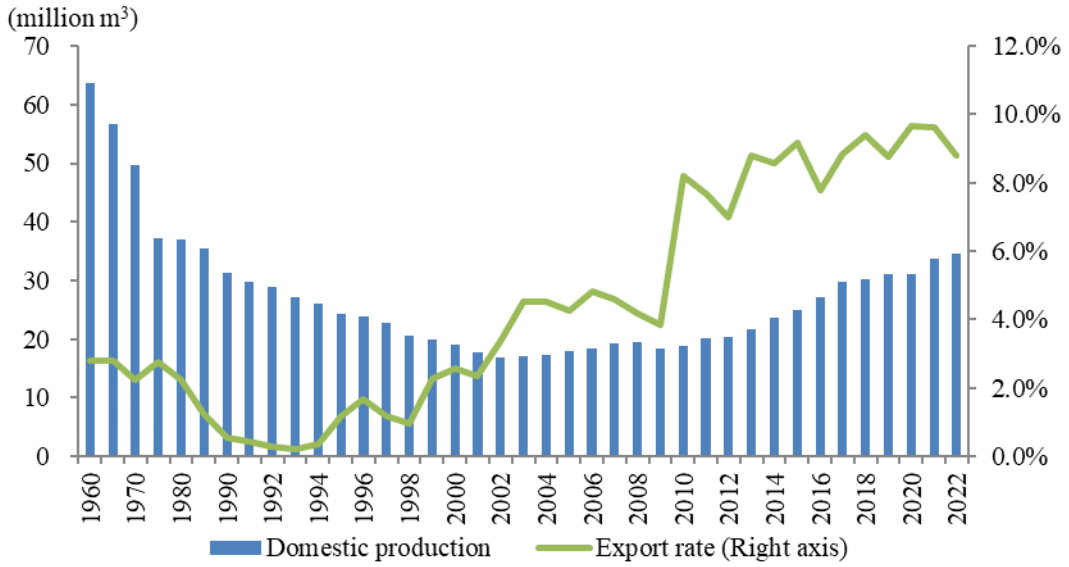


Figure 78: Changes in the ratio of export volume to total production of wood and wood products
Source: Forestry Agency, Wood Supply and Demand Chart.

6.1.i Recovery or recycling of forest products as a percent of total forest products consumption

Rationale

This indicator provides information on the extent to which forest products are recycled or recovered. Recycled and recovered products are an important source of wood fibre for many industries and may compete with or substitute for harvested wood. Such products can help meet the demand for forest products without increasing harvest levels.

Current status and trends

There is no statistical data available on the ratio of recovered or recycled forest products to total consumption.

About 98% of sawmill residue is recycled for wood board, paper, energy, and other purposes. The percentage is considered to have reached the current recovery limit. For wood derived from construction, the Basic Policy Based on the Construction Material Recycling Act and the Construction Recycling Promotion Plan 2020 set recycling and reduction rates goals, and measures are taken to achieve the goals. As a result, 96% of the waste wood generated at construction and demolition sites is used for various purposes, including paper stock, board material, bedding for livestock, and energy.

Table 12: Annual biomass generation and utilization rate

Type of biomass	Annual generation	Current utilization rate	Target for 2030
Sawmill residue	Approx. 5.1 million tons	Approx. 98%	Approx. 98%
Wood derived from construction	Approx. 5.5 million tons	Approx. 96%	Approx. 96%

Note: The current annual amount of paper generation and utilization rate are compiled as of April 2021 based on various statistical data (Some items include estimated values).

Source: MAFF, Basic Plan for Promoting Biomass Utilization (September 6, 2022).

The long-term trend for the recovered paper utilization rate for paper and paperboard has been an upward trend, and although it remained almost flat in the 2010s, it rose slightly in 2020. The recovered paper utilization rate in 2022 reached 66.3%.

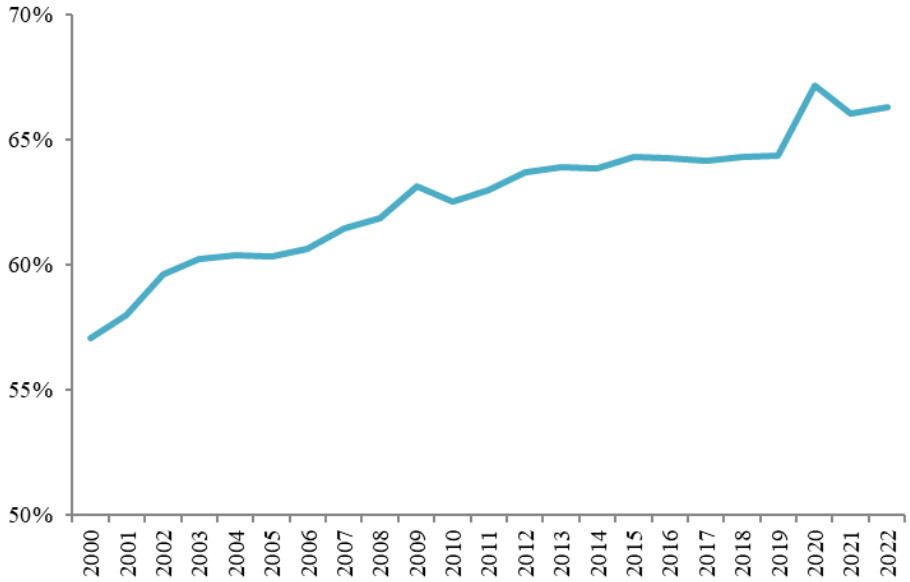


Figure 79: Changes in paper recycling rate to paper and paperboard production

Note: Paper includes statistical codes of 4240-0101 to 4240-0131. Cardboard includes statistical codes of 4260-0101 to 4260-0110.

Source: METI, Paper and Pulp Statistics (up to 2001); METI, Paper, Printing , Plastic Products and Rubber Products Statistics (from 2002 to 2012); METI, Paper, Printing, Plastic and Rubber Statistics of Current Production Statistics Survey (from 2012 onwards).

6.2 Investment in the forest sector

These indicators provide information on long-term and annual expenditures to enhance forest management, forest-based enterprises, and the knowledge and skills of people who are engaged in the forest sector. Maintaining and enhancing the long-term multiple socio-economic benefits derived from forests depends in part on investment in the forest sector, including both long-term capital investments and annual operating expenditures.

6.2.a Value of capital investment and annual expenditure in forest management, wood and non-wood forest product industries, forest-based ecosystem services, recreation and tourism

Rationale

This indicator quantifies investment and expenditure in developing, maintaining and obtaining goods and services from forests. Maintaining and enhancing forests and their benefits often depends on regular investments in restoration, protection, and management, as well as in operations, forest industries and forest-based ecosystem services. When the capacity to protect, manage and use forests is eroded through lack of funding, the benefits that forests provide may decline or be lost.

Current status and trends

There is no data for a comprehensive assessment of the value of capital investment in the forest sector. In the Input-Output Tables, annual capital investments in the forestry sector (i.e., silviculture, log production, NTFPs) and the lumber and wood products sector (i.e., lumber, plywood and laminated timber, wood chips, other wood products, wood products for construction, wood products not elsewhere classified) in 2020 were estimated as 319.3 billion yen and 1,309.3 billion yen, respectively. Investment in the forestry and wood industry has been on a downward trend since the 1980s, and investment in the wood industry has been on a downward trend since 1995, but both have been on an upward trend since 2011.

In recent years, in order to integrate biodiversity and natural capital into corporate management as well as climate change countermeasures from the perspective of ensuring the sustainability of corporate business, the Task Force on Climate-related Financial Disclosure (TCFD) and the Task Force on Nature-related Financial Disclosure (TNFD) has been promoted internationally, and companies are increasingly interested in these mechanisms.

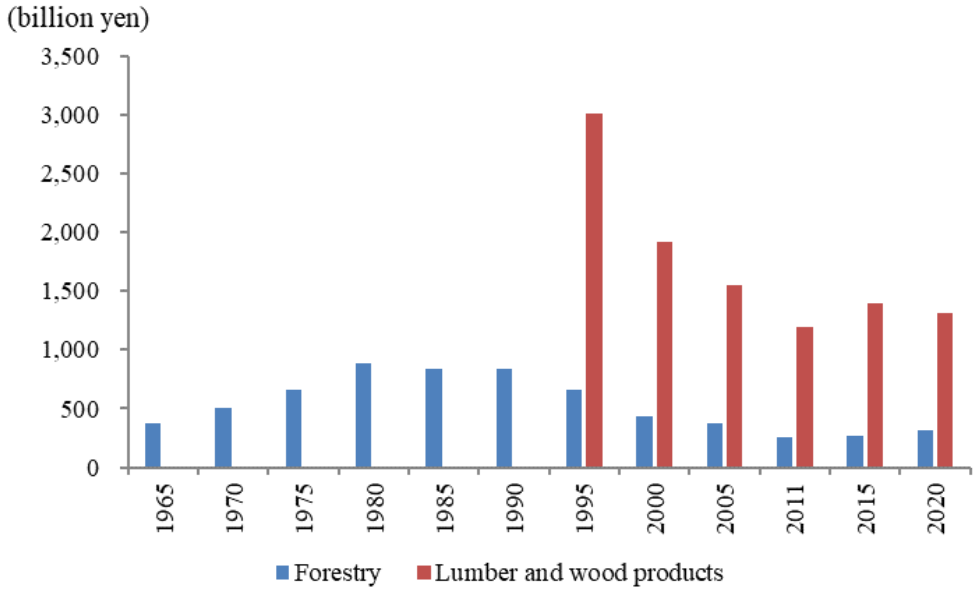


Figure 80: Changes in the value of capital investment in the forestry and the wood industries
Source: MIC, Input-Output Table.

6.2.b Annual investment and expenditure in forest-related research, extension and development, and education

Rationale

This indicator provides information on annual investment and expenditure in forest-related research, extension and development, and education. Research underpins scientific understanding, including the ability to practice improved forest management and to develop and apply new technologies. Education, including extension activities, increases public awareness of the multiple benefits provided by forests.

Current Status and Trends

Various entities, including the national and prefectural governments and private companies, are conducting research and development, extension, and education, but there is no aggregate data on the total investment values. Research budgets of the FFPRI and the FTBC, both of which mainly conduct research and experiments under the Forest Research and Management Organization, as National Research and Development Agency, have been around 10 billion yen in recent years.

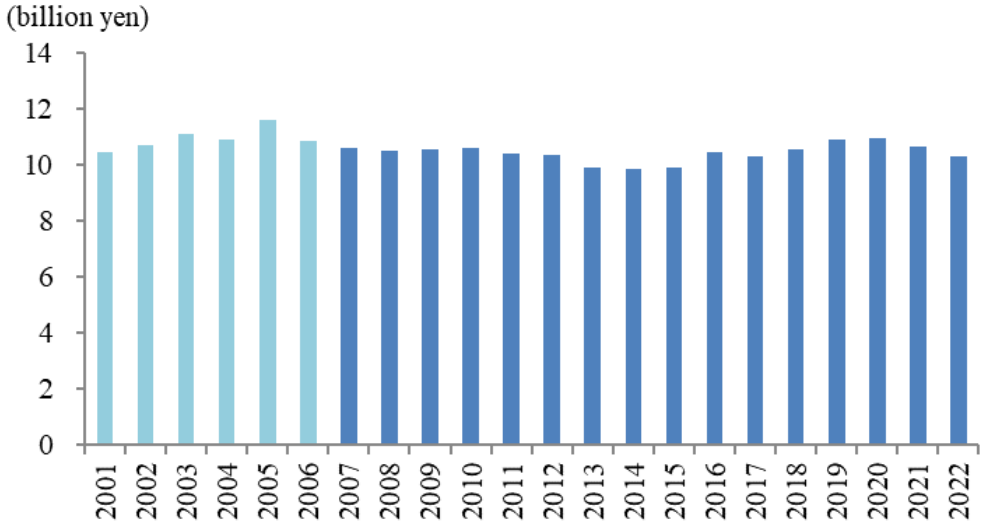


Figure 81: Changes in the research budget of the FFPRI

Note: The figures up to 2006 are the sum of the research budgets of the FTBC and the FFPRI. The FTBC was incorporated into the FFPRI in 2007.

Sources: FFPRI, Annual Report; FTBC, Annual Report (up to 2006).

6.3 Employment and community needs

Forest-based and forest-related employment is a useful measure of the social and economic importance of forests at the national and local level. Wage and income rates and injury rates are indicators of employment quality. Communities whose economies are concentrated in forest industries, or who rely on forests for subsistence purposes, may be vulnerable to the short or long-term effects of economic or policy changes in the forest sector. These indicators provide information on levels and quality of forest employment, community resilience to change, use of forests for subsistence purposes, and the distribution of revenues from forests.

6.3.a Employment in the forest sector

Rationale
This indicator provides information on the level of direct and indirect employment in the forest sector. Employment is a widely understood measure of economic, social and community wellbeing.

Current status and trends
In 2020, the number of forestry workers (i.e., persons engaged in forestry work) was approximately 44 thousand, a slight decrease from approximately 45 thousand in 2015. The ratio of forestry works to the number of employed persons in all industries has decreased since about 0.26% in 1980 and has leveled off in recent years. In 2020, it was 0.08%.

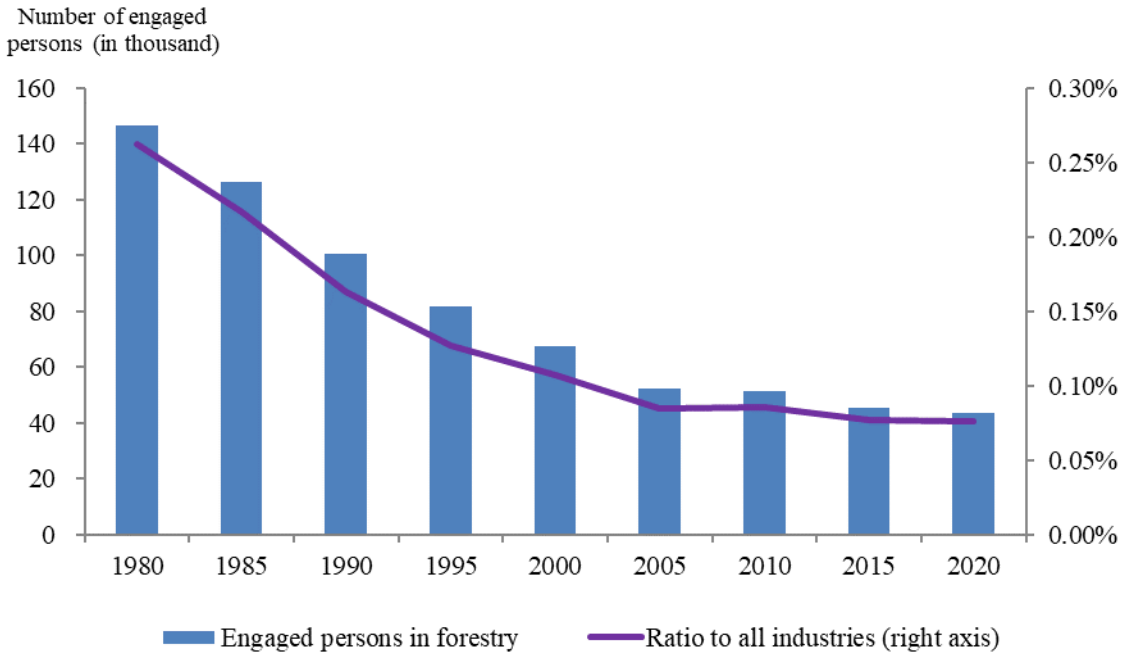


Figure 82: Changes in the number of forestry workers and their percentage of total employment
Source: MIC, Population Census.

The number of employed persons in the timber and wood products industry (i.e., persons engaged in wood product manufacturing, etc., including administrative staff and managers) was approximately 103 thousand in 2020, slightly decreasing from approximately 118 thousand in 2015. The ratio of employed persons in the timber and wood products industry to the number of employed persons in all industries has decreased since about 0.75% in 1980 and has leveled off in recent years. In 2020, it was 0.18%.

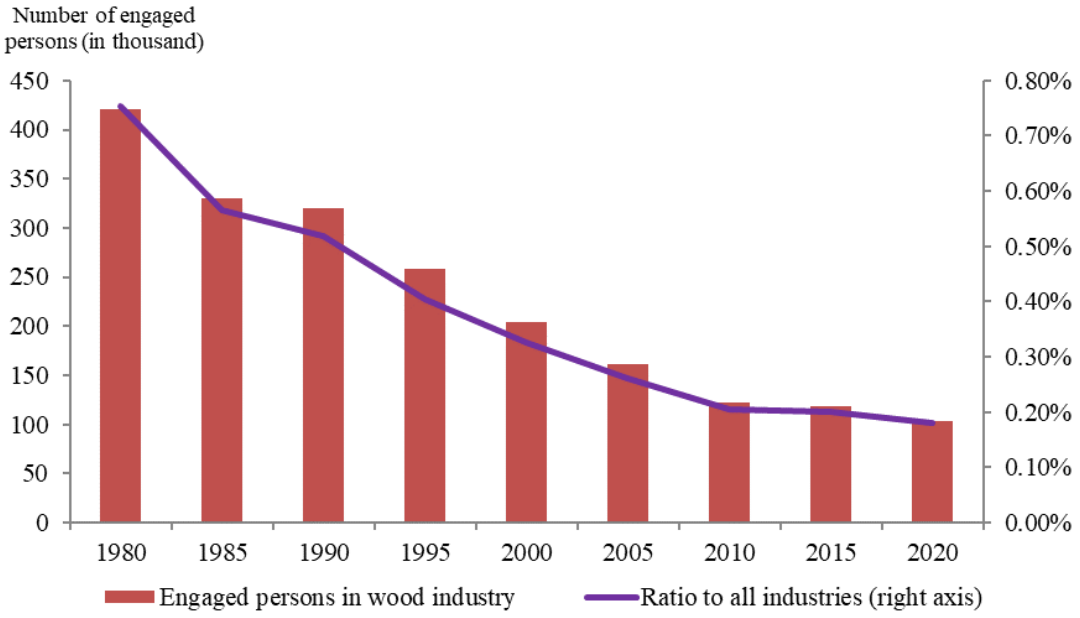


Figure 83: Changes in the number of employment in wood industry and in its share of total employment
Source: MIC, Population Census.

In Japan, the "Green Employment" program started in 2003 to support young people who are willing to work in the forest sector in acquiring basic techniques that are necessary for forestry. Under the program, implementation of on-the-job training by the enterprises and joint training by training organizations for persons who have been newly employed by forestry enterprises is supported. By 2023, approximately 24 thousand persons were newly employed in the forest sector utilizing the program.

Although the number of workers newly employed by forestry enterprises was approximately 2,000 per year before the program started, the number has increased to approximately 3,200 per year after the program started. Among the persons who have completed the training under the program, about 70% are still engaged in the same work after three years.

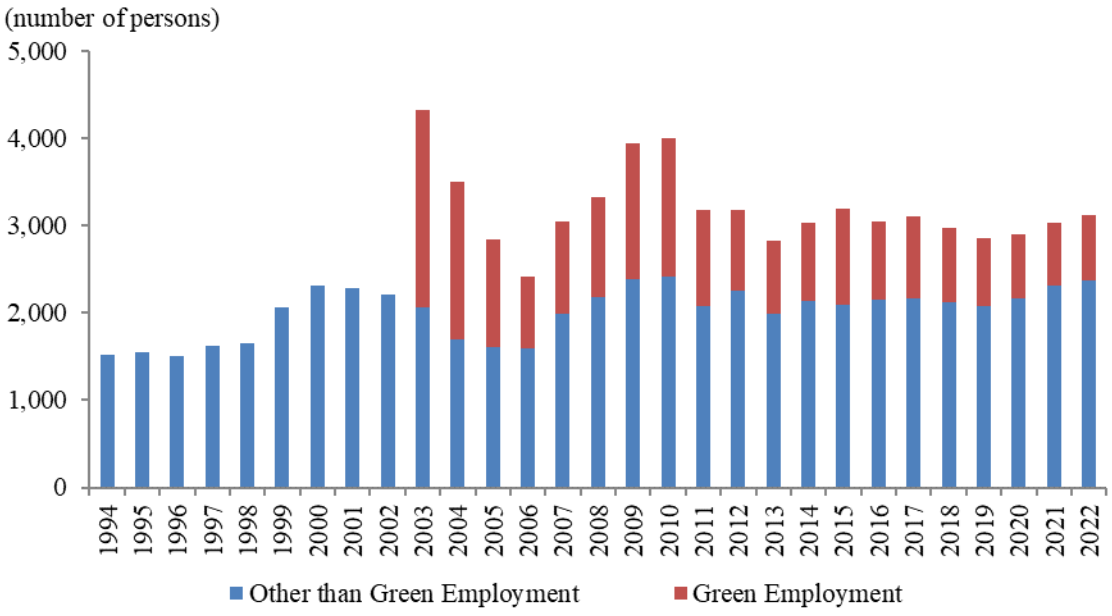


Figure 84: Changes in the number of persons who are newly engaged in the forestry sector
Source: Forestry Agency.

6.3.b Average wage rates, annual average income and annual injury rates in major forest employment categories

Rationale
This indicator provides information on average wage, income and injury rates. These are important aspects of employment quality and the economic value of forests and forest related employment to communities.

Current status and trends
Forestry work is often forced to stop in the event of bad weather, and the days of work are greatly affected by the weather, so the daily wage system still prevails in this sector. The average daily wage of forest workers in 2023 is around 14 thousand yen for silviculture work and 15 thousand yen for logging operations. Since 2011, the average wage for forest workers has slightly increased.

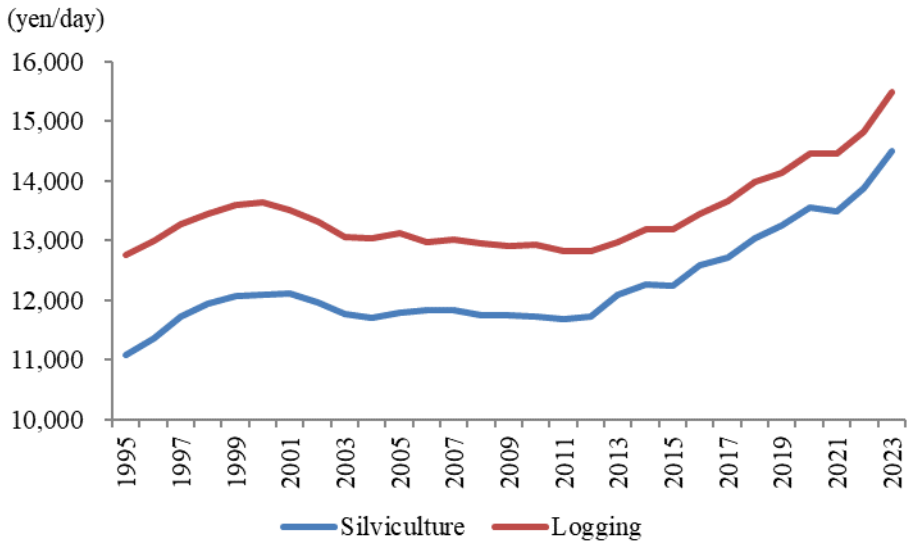


Figure 85: Changes in average wage of forest workers
Source: National Chamber of Agriculture, Results of Survey on Farm Work Fees and Agricultural Wages.

The average annual income of workers in the timber and wood products manufacturing industry employees in 2021 was around 3.74 million yen, which is approximately 20% lower than that of the average income of all manufacturing industries, that is approximately 4.68 million yen. The average annual income of wood industry employees has been slightly increasing since 2011.

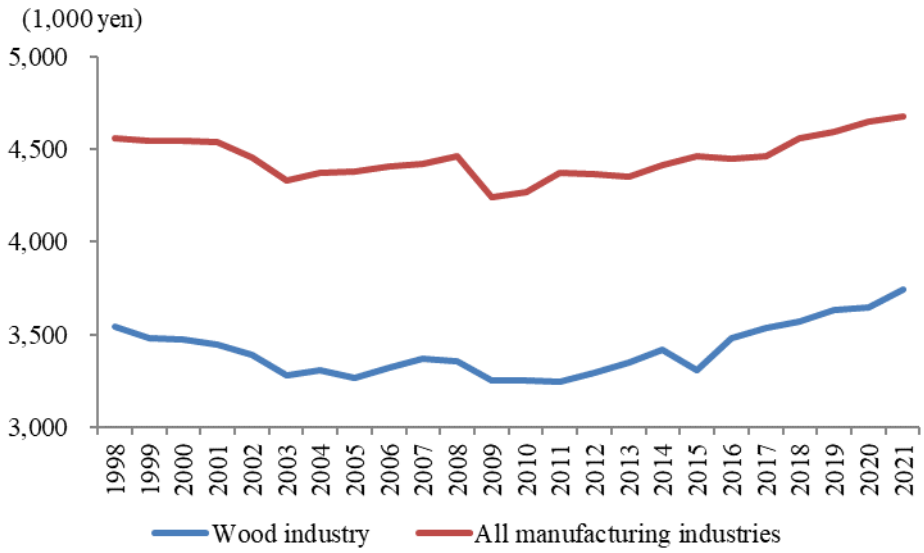


Figure 86: Changes in average annual income of employees in wood industry and in all manufacturing industries

Source: METI, Census of Manufacture (up to 2020); MIC and METI, Annual Business Survey (from 2021 onwards).

Occupational accidents in forestry have been decreasing in the long term. This may be a result of the reduced workload due to the introduction of harvesters, processors, forwarders, and other high-performance forestry machines and the development of forest road systems, including logging roads. The spread of protective wear for chainsaw work may also have contributed to the reduction.

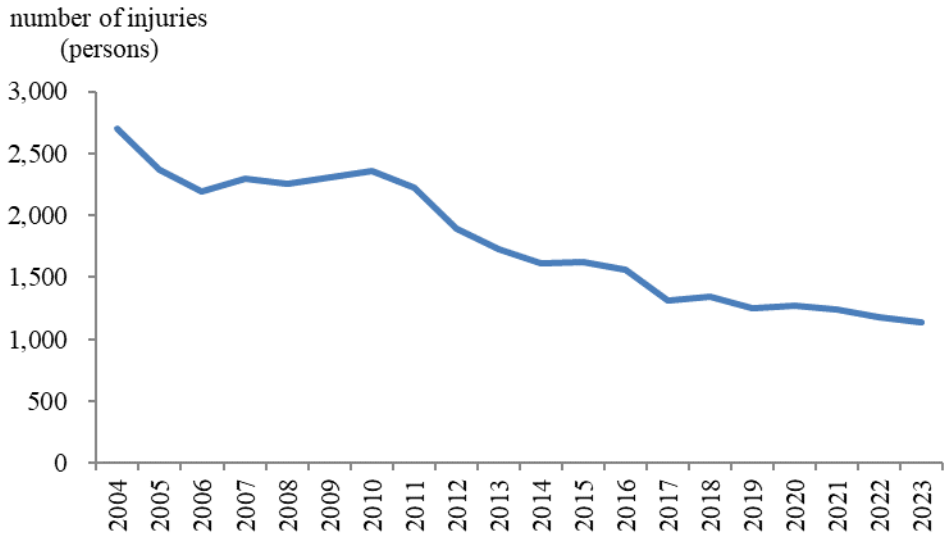


Figure 87: Changes in the number of fatalities and injuries in forestry

Source: MHLW, Reports of Worker Casualties.

Nevertheless, due to the nature of forestry work which often involves the handling massive objects such as harvested logs on steep slopes, the annual accident rate among forest workers was 22.8 per 1,000 workers in 2023. This is approximately 9.5 times higher than the average across all industries, i.e., 2.4.

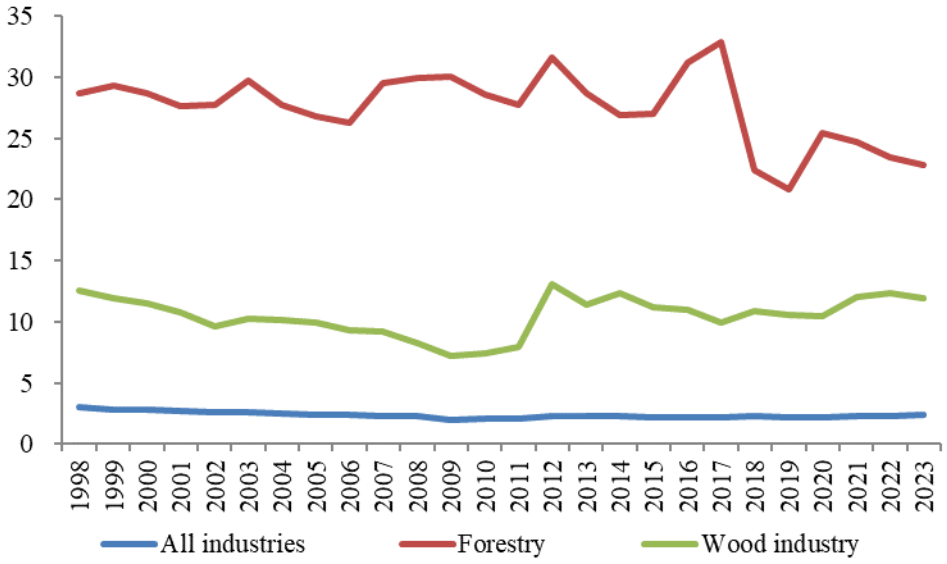


Figure 88: Changes in annual accidents rate per 1,000 workers in forestry and wood industry
Sources: MHLW, Reports of Worker Casualties; MIC, Labor Force Survey.

6.3.c Resilience of forest-dependent communities

Rationale:
This indicator provides information on the extent to which communities dependent on forests for their wellbeing, livelihoods, subsistence, quality of life or cultural identity are able to respond and adapt to social and economic change.

Current Status and Trends
Based on the Mountain Village Development Act, “Developing Mountain Villages” (mountain village areas designated for special development and revitalization efforts) were designated in 734 municipalities, which is about 40% of the total number of municipalities in Japan, in 2023, and they account for about 50% of the national land area and about 60% of the forest area.

In Japan, the population increased for a long period of time, exceeding 120 million in the 1980s, but the 2015 national census showed that the population had decreased for the first time since the start of the census in 1920, decreasing by 1.5% over the 10 years from 2010.

Meanwhile, in mountain villages, the population has continued to decline due to the outflow of young people. In the 10 years from 2010, there was a 7% population decline in “Developing Mountain Village municipalities,” where some parts of the municipality were designated as “Developing Mountain Villages,” and a 19% population decline in “All Mountain Villages” where the entire area was designated as “Developing Mountain Villages.”

In 2020, the percentage of people aged 65 and over in 2020 is 31% in “Promotion Mountain Village Municipalities” and 41% in “All Mountain Villages,” compared to the national average of 28%. Indicators concerning convenience in everyday life, including the rates of flush toilets and medical facilities, are also low in mountain village areas.

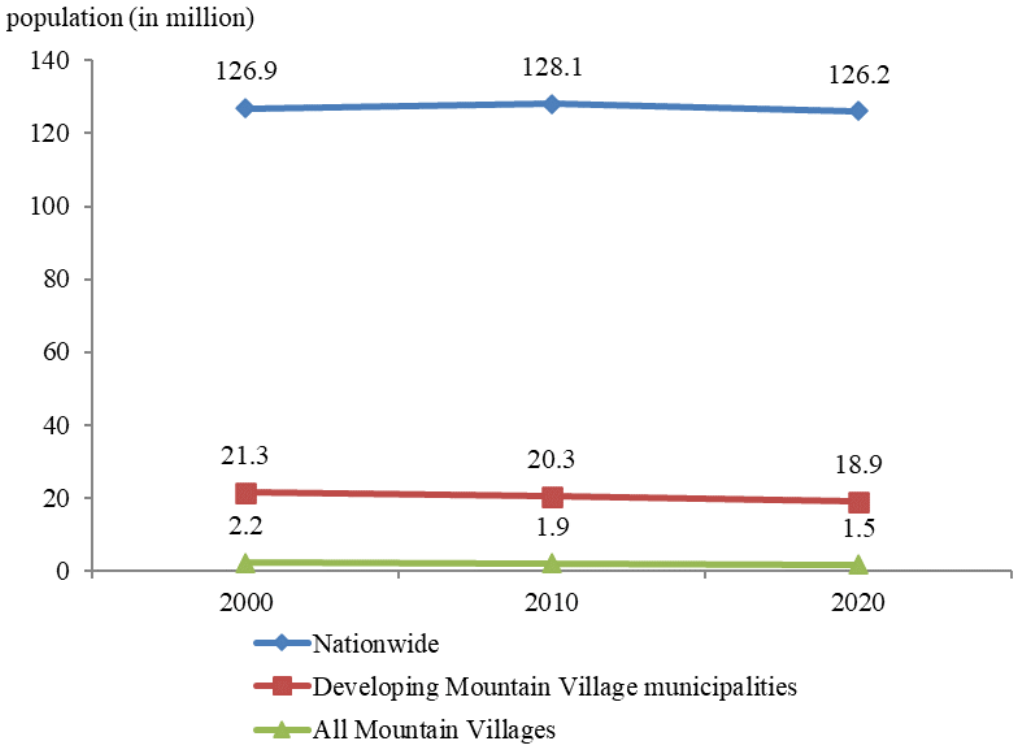


Figure 89: Changes in population of Japan

Note: "Developing Mountain Village municipalities" is where some parts of the municipality were designated as "Developing Mountain Villages," and "All Mountain Villages" where the entire area was designated as "Developing Mountain Villages."

Source: MAFF, Survey on Mountain Village Areas; MIC, Population Census.

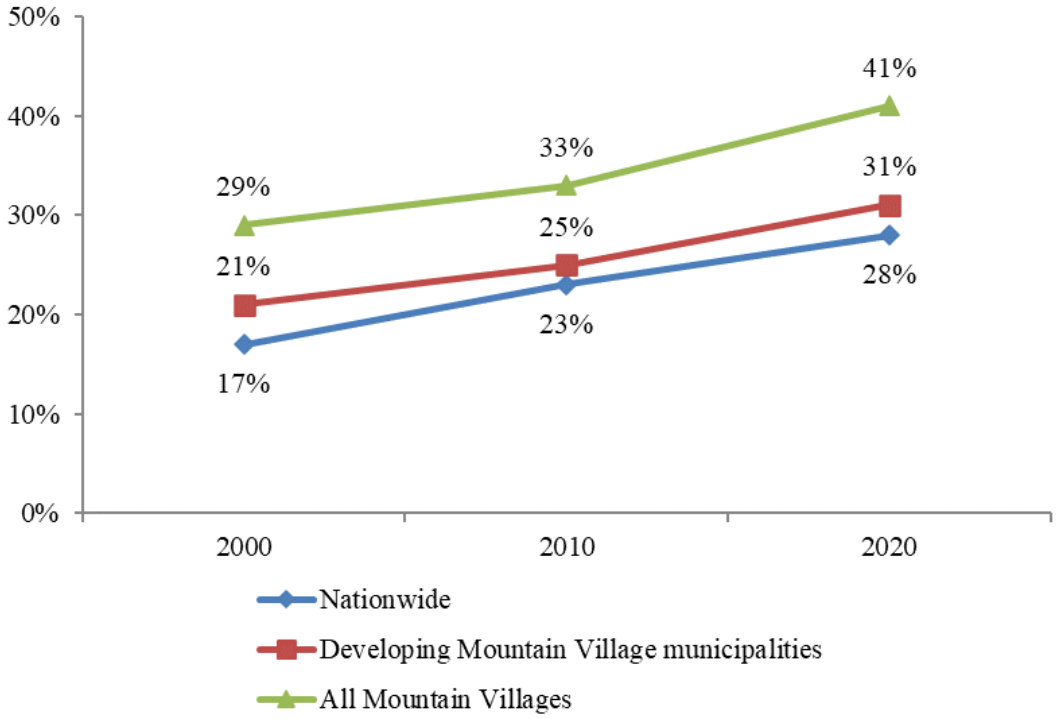


Figure 90: Changes in the rate of aging (proportion of the population aged 65 or older)

Source: MAFF, Survey on Mountain Village Areas; MIC, Population Census.

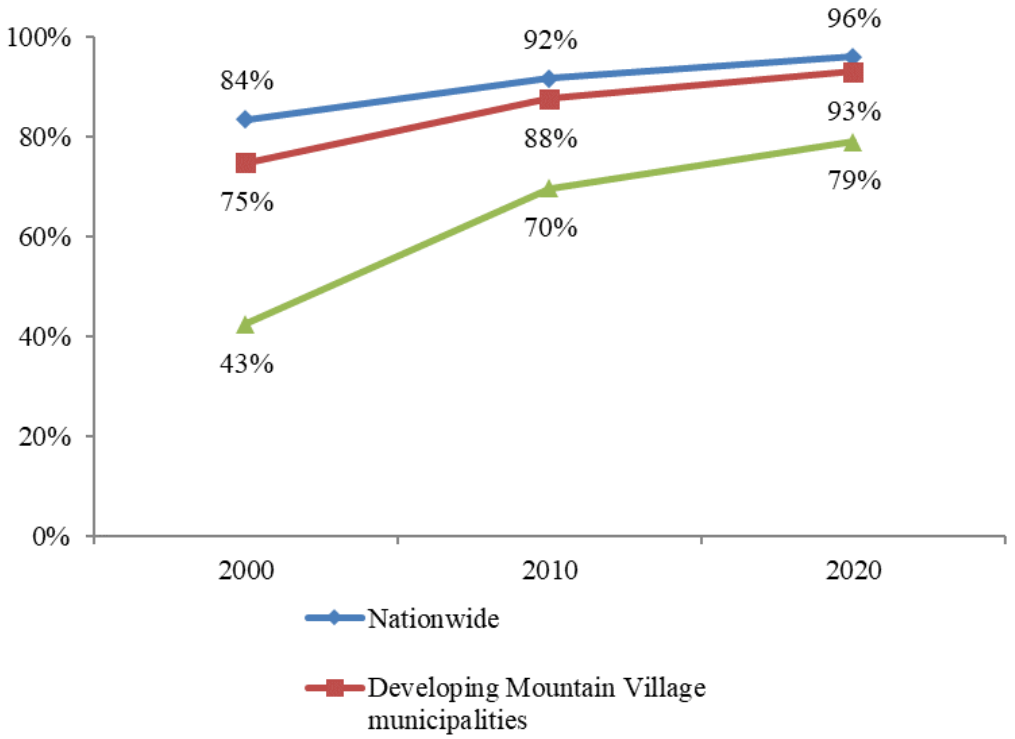


Figure 91: Comparison of the rate of flush toilets
Source: MOE, Waste Disposal of Japan; MAFF, Survey on Mountain Village Areas.

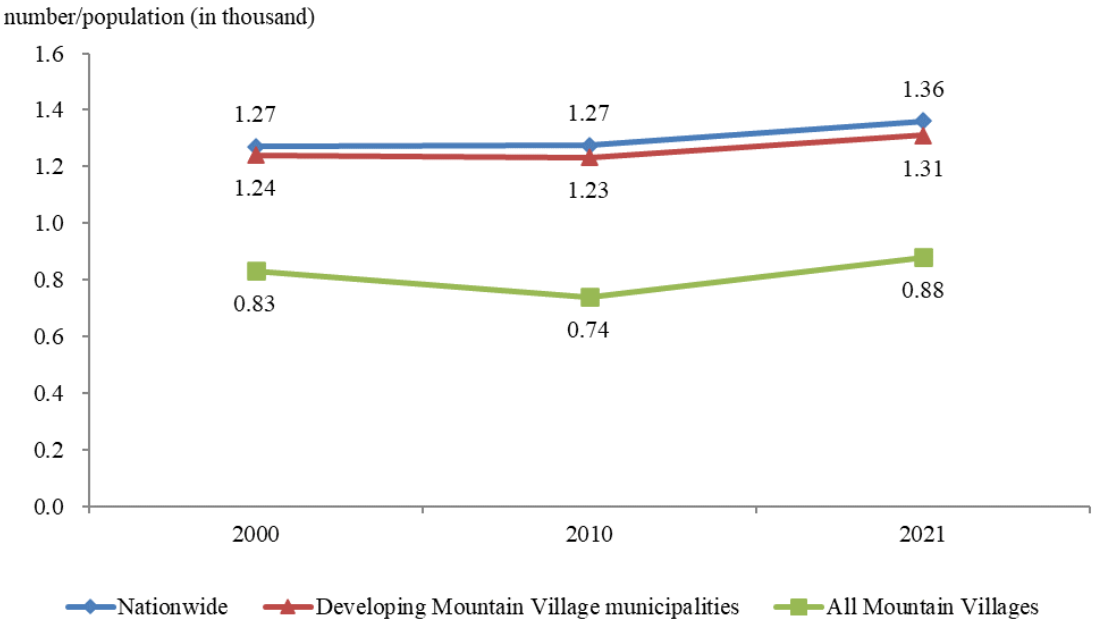


Figure 92: Changes in the number of hospitals/clinics per 1,000 people
Sources: MIC, Survey on Public Facilities; MAFF, Survey on Mountain Village Areas.

6.3.d Area and percent of forests used for subsistence purposes

Rationale:
This indicator provides information on the extent to which indigenous and other communities rely on forests as a source of basic commodities, such as food, fuel, shelter and medicinal plants. The practice of forest-based subsistence reflects the dependence of rural communities and individuals on forests for essential resources and may be closely linked to cultural identity and quality of life.

Current status and trends
In Japan, there has long been a form of forest management in which local residents customarily use forests collectively, such as forests owned by the communities and common forests. With the implementation of the municipal system in 1889, some of them were transferred to municipalities and some became forests owned by multiple people through change of ownership to common ownership by right holders.

The Act on Advancement of Modernization of Rights in Relation to Forests Subject to Rights of Common was enacted in 1966. Considering that rights in common forests such as village forests jointly used by village communities were mainly customary common rights and rights to use based on old customs before the introduction of modern legal system in Meiji Restoration, the act aimed to dissolve these rights and promote clarification of ownership.

Later, many of the groups owning a forest in common were organized into forest producers' cooperatives based on the Forestry Cooperative Act. There were 2,571 forest producers' cooperatives at the end of FY2022, 61% of which answered that they were established for joint management of forests owned by the community. The total area of forests managed by forests producers' cooperatives is 310 thousand ha. Activities carried out there include forest management, production of trees for greening or edible mushrooms, and farming.

As of the end of FY2022, about 1.13 million ha of national forest land was designated as reserved forests permitted to customary use of local dwellers. Usually, the use of national forests is limited to public undertakings, but local communities are given exceptional status for customary use based on the Act on Management of National Forest Land. Based on a contract with the District Forest Office concerned, residents can collect commodities for daily consumption, such as fuelwood and edible wild plants and mushrooms for their own consumption. However, the total area of the common forests has been decreasing due to the aging and declining population.

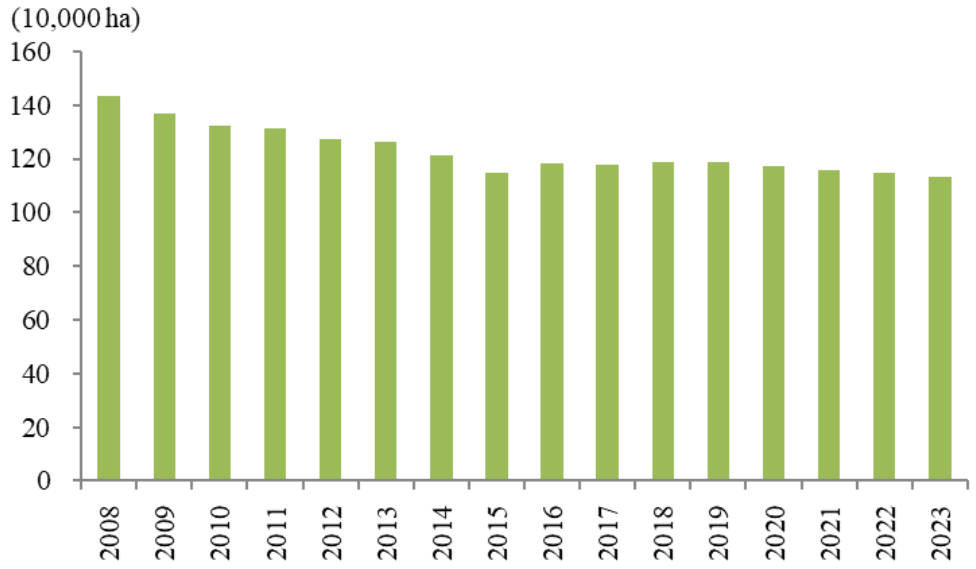


Figure 93: Changes in the area of community use in national forests
Source: Forestry Agency, National Forest Management Statistics.

6.3.e Distribution of revenues derived from forest management

Rationale:
This indicator provides information about the flow and distribution of revenues derived from forest services, management and use back into forest-based communities, wider society and the forest sector. The distribution of those revenues provides information on the extent to which forest-based communities, the forest sector, and the wider society share in the economic benefits generated by forests.

Current status and trends
According to the results of a systematic random sampling survey of forestry households with forests of 20 ha or more and engaged in forestry work, the annual forestry gross income of forest owners per household, including production of logs and standing timber sales, was 3.78 million yen, and annual expenses including wages for employees and contract fee for forest management was 1.37 million yen in 2018. It is considered that about 36% of the revenue generated from forest resources was directly distributed to the local community as labor expenses, etc.

While forestry gross income has increased in recent years, the ratio of expenses in contract and employment to forestry gross income has also increased. The profit margin had been on a declining trend but turned to an increase from 2013 to 2018.

Figure 94: Changes in forestry gross income and expenses in contract and employment for forest management

Note 1: Between 2003 and 2007, the subjects of the survey are forestry households with forest of 50 ha or more, and who are engaged in work related to forest trees, or forestry households with forest of 20 ha or more but less than 50 ha, and who are engaged in work related to forest trees for 30 days or more in the past year. In 2008 and 2013, the subjects are family-owned management entities with forest of 50 ha or more, and who are engaged in work related to forest trees, or with forest of 20 ha or more but less than 50 ha, and who are engaged in work related to forest trees for 30 days or more in the past year. In the 2018, the subjects are , family-owned management entities with forest of 20 ha or more and (1) have the member of the household who are engaged in work related to forest trees for 30 days or more in the past year, or (2) whose forest area of operations in the past year meets one of the following requirements. (a) The area of felling is 1 ha or more, (b) planting or commercial thinning area is 2 ha or more or (c) nursery area is 5 ha or more.
Note 2: Forestry gross income and expenses in contract and employment are per forest owner household.
Source: MAFF, Report of Survey on Forestry Management.

6.4 Recreation and tourism

Forests have long been used as a place for recreation and other leisure activities. The location and accessibility of forests and the availability of recreation facilities are important to forest-based recreation and tourism. Levels of use are an indication of the extent to which forests are valued by society for these uses.

6.4.a Area and percent of forests available and/or managed for public recreation and tourism

Rationale
This indicator provides information on the area and extent of forests available and/or managed for recreation and tourism activities. The availability and management of forests for these activities is a reflection of society's recognition of the value of forests for recreation and tourism.

Current Status and Trends
As stated in Indicator 4.1.a, protection forests are designated for various public functions, including conservation of soil and water resources. As of 2023, approximately 730 thousand ha is designated as protection forests for public health or scenic site conservation mainly for forest recreation and tourism activities.

In addition, as of 2023, about 240 thousand ha of national forest land with excellent natural landscapes and suitable for forest bathing, nature observation, outdoor sports, and other purposes is designated as Recreation Forests.

Furthermore, there are about 4 million ha of forests in National Parks and other natural parks.

6.4.b Number, type, and geographic distribution of visits attributed to recreation and tourism and related to facilities available

Rationale:
This indicator provides a measure of the level and type of recreation and tourism use in forests. The number and geographic distribution of visits and the facilities available reflect the extent to which people participate in forest-based leisure activities and the importance of forests for recreation and tourism.

Current status and trends
Though it is difficult to accurately grasp the number of available facilities for recreation/tourism activities in forests, as an example, as of 2023, a total of 576 recreational forests (approximately 240,000 ha) of national forest in total have been selected as the Recreation Forests. The Recreation Forests are divided into six types according to the characteristics of the forest and the purpose of its use: nature recreation forests, nature observation education forests, landscape forests, sports forests, outdoor sports areas, and forests for enjoying scenic beauty. About 100 million people in total visited these forests in FY2022.

Table 13: Establishment and usage of the Recreation Forests

Type	Characteristics	No. of sites	Area (1,000 ha)	No. of visitors (million)
Nature recreation forest	Forests with special beauty in landscapes and suitable for recuperation. Visitors can enjoy multiple activities, including nature trips, climbing, hiking, and camping.	79	94	19
Nature observation education forest	Forests with varied scenes and suitable for nature observation and learning. Visitors can observe wild flora and fauna and learn forest functions.	87	22	11
Landscape forest	Forests and historic spots forming a scenic area. Visitors can appreciate the grand prospect of the forest and the history of the region.	145	62	43
Sports forest	Forests suitable for outdoor sports in contact with the forest. Visitors can feel nature through camping, cycling, etc.	26	3	3
Outdoor sports area	Areas incorporating ski slopes, accommodation facilities, etc. Visitors can work out in a magnificent landscape.	164	49	16
Forest for enjoying scenic beauty	Areas where forests, lakes, and valleys form an excellent natural landscape. Visitors can enjoy various trees and natural beauty.	75	13	7
Total		576	243	99

Note 1: The number of locations and area are figures as of April 1, 2023. The number of users is a reference for FY2022.
Note 2: Discrepancies in totals are rounded.
Source: MAFF, Implementation Status of the Basic Plan for Management and Operation of National Forests in FY2022.

In the Recreation Forests, forests and facilities are developed in a planned way according to the conditions, while at the same time maintaining a good natural environment and considering regional development.

Among the Recreation Forests, 93 sites with particularly beautiful landscapes that are definitely worth visiting have been selected as "Japan's Forest with Breathtaking Views." In addition to disseminating information on the attractiveness of these national forests both in Japan and overseas, multilingual signboards and sidewalks have been installed as a priority.

Figure 95: Examples of "Japan's Forests with Breathtaking Views"
Source: Forestry Agency.

6.5 Cultural, social and spiritual needs and values

People and communities, in both rural and urban areas, have a variety of cultural, social, and spiritual connections to forests based on traditions, experiences, beliefs, and other factors. Among them, the spiritual and cultural connections of indigenous people to forests often form part of their identity and livelihood. These values may be deeply held and influence people's attitudes and perspectives towards forests and how they are managed. These indicators provide information on the extent to which cultural, social, and spiritual needs and values exist and are recognized by society.

6.5.a Area and percent of forests managed primarily to protect the range of cultural, social and spiritual needs and values

Rationale:
This indicator measures the extent of forests managed primarily for their cultural, social and spiritual values to people and communities, including indigenous communities and others with strong ties to forests. The protection of forests to meet such needs and values is a reflection of the extent to which they are recognised by society.

Current status and trends
As described in Indicator 4.1.a, protection forests are designated for the conservation of soil and water resources, as well as for the fulfillment of various public functions, as described in Indicator 6.4.a. In 2023, approximately 730 thousand ha of forest land are designated as protection forests for public health or scenic site conservation for the purpose of forest recreation and sightseeing.

As stated in Indicator 7.5.a there is an initiative in national forests called “Forests for Wood Culture,” which implements activities to secure the timber, bark, and other materials necessary to pass on “wood culture” such as historical wooden structures and traditional crafts, to future generations. By 2023, 24 locations with an area of 1,626 ha had been established.

In addition, as described in Indicator 6.4.a, there are approximately 4 million ha of forests in National Parks and other natural parks.

6.5.b The importance of forests to people

Rationale:
This indicator provides information on the range of values that communities and individuals hold for forests. These values shape the way people view forests, including their behaviours and attitudes to all aspects of forest management.

Current situation and trends
In the "Public Opinion Survey on Forests and Living" conducted by the Cabinet Office in October 2023, when respondents were asked about the top three functions, they expected forests to perform among the multiple functions of forests, the percentage of respondents who answered that they expected forest to prevent global warming, prevent mountain disasters, and water resource conservation was high.

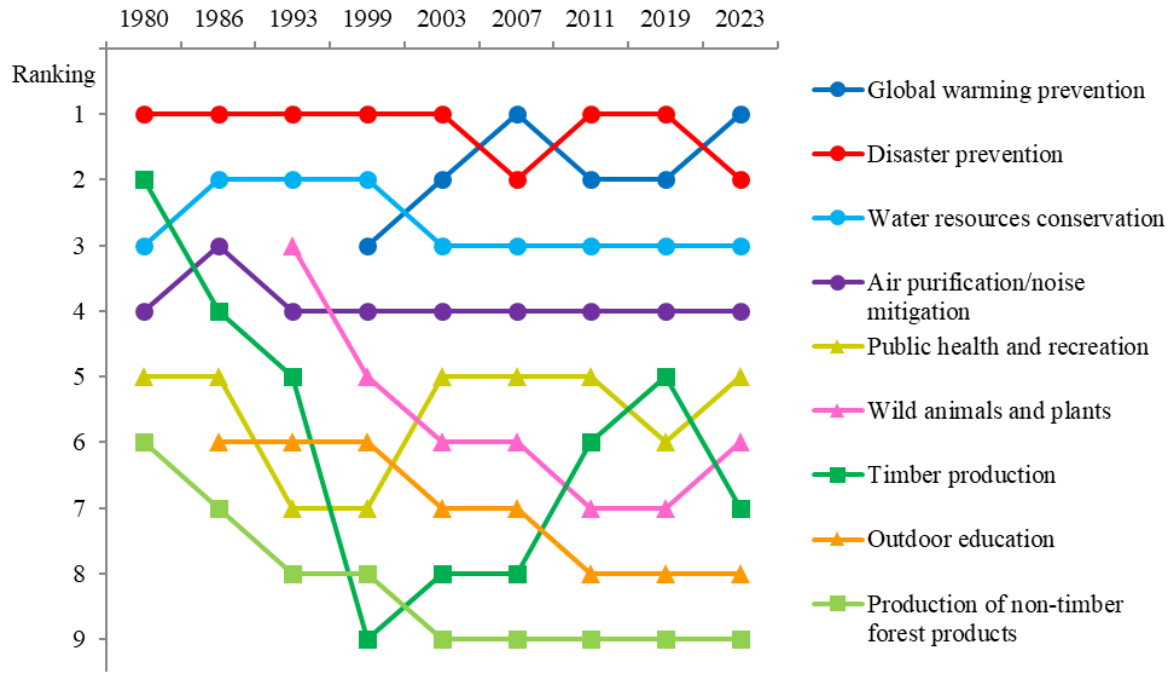


Figure 96: Changes in public expectations on forests
Note 1: Multiple answers to select three of the alternatives.
Note 2: The responses "Nothing in particular," "Do not know," and "Other" are not included in the chart.
Source: Prepared by Forestry Agency based on Prime Minister's Office, Poll on Forest and Forestry (1980); Poll on Greenery and Trees (1986); Poll on Forest and Greenery (1993); Poll on Forest and Living (1999); Cabinet Office, Poll on Forest and Living (2003, 2007 2011, 2019 and 2023).

Criterion 7: Legal, institutional and economic framework for forest conservation and sustainable management

Criterion Seven relates to the overall economic, legal, institutional, and policy environment of a country. This Criterion provides a context for the consideration of Criteria One to Six.

Legislation, institutional capacity and economic arrangements, with associated policy measures at both national and sub-national levels, create an enabling environment for the sustainable management of forests. Reporting against these indicators contributes to raising public and political awareness of issues affecting forests and builds support for their sustainable management.

7.1.a Legislation and polices supporting the sustainable management of forests

Rationale
This indicator provides information on legislation and policies, including regulations and programmes, which govern and guide forest management, operations and use. Legislation and policies designed to conserve and improve forest functions and values are prerequisite to achieving the sustainable management of forests.

Current status and trends
While various laws and regulations are enacted to support the sustainable forest management in Japan, the basic framework is supported by the Forest and Forestry Basic Act and the Forest Act.

The Forest and Forestry Basic Act provides sustainable fulfillment of multiple functions of forests as its basic philosophy, and stipulates sound forest management and conservation, promotion of rural area and sustainable and sound development of forestry as its principle. It provides that the national government, in consideration of the importance to promote sustainable fulfillment of multiple functions of forests with international collaboration, is to promote international coordination of efforts to establish rules relevant to the forest management and conservation. This provides justification for activities on the criteria and indicators of the Montréal Process.

In addition, based on the Forest and Forestry Basic Act, for the comprehensive and systematic promotion of forest and forestry policies, the government establishes the "Basic Plan for Forest and Forestry." The plan is to be revised approximately every five years, taking into consideration the changes in circumstances surrounding forest and forestry and other relevant matters.

The current Basic Plan for Forest and Forestry, which was established in June 2021, aims to develop a "new forestry" that makes it possible to convert the balance of income from logging to reforestation and nurturing by utilizing new technologies, strengthen the competitiveness of the timber industry, and capture new demand for timber in buildings such as cities. In addition, the Basic Plan for Forest and Forestry aims to achieve "green growth" that will contribute to carbon neutrality by 2050 by promoting the sustainable use of forest resources and continuing to make efforts to become a growth industry while ensuring proper management of forests through reforestation, etc.

The Forest Act is enacted for providing basic matters concerning the forest planning system, protection forests and other fundamental issues on forest, seeking the sustainable forest management, and promoting forest productivity, thereby contributing to the conservation of the national land and development of the national economy. The Act contains provisions serving as the basis for various regulations, rules and guidelines, etc. concerning the forest planning system which is to be established for promoting systematic and appropriate management of forests from a long-term perspective, forest land development permission system for securing sound use of forestland, protection forest system for achieving specific public objectives such as headwater conservation and disaster prevention, etc.

Under the Forest Act, the Minister of Agriculture, Forestry and Fisheries is to establish the "Nationwide Forest Plan" every five years with a period of fifteen years and thereby present the targets for management and conservation of forests, designed volume of harvest and re-planting, and criteria for forestry practices, etc. In the 15-year plan formulated in October 2023, from FY2024 to FY2038, the description of the appropriate implementation of safety measures for embankments, etc., the strengthening of efforts to confirm the legality of timber, and the acceleration of measures against pollen sources were added, and the amounts of wood harvested, the area of afforestation, etc., were revised according to the new plan period.

The prefectural governor and the director-general of Regional Forest Office are to formulate the "Regional Forest Plan" and "Regional Plan for National Forest" for private forests and national forests, respectively, for each of the 158 forest planning areas. These plans provide the targets for management and conservation of forests, as well as the concept of the forest management practices such as zoning of forests, logging, etc., depending on the situation of each area.

The municipality is to formulate the "Municipal Forest Plan" compatible with the Regional Forest Plan. The

plan provides residents with the long-term concept concerning the forest management in the area and code of concept for forestry operation and forest protection, and thereby indicates the specific forestry practices by zone and the plan on forest road system, etc.

In addition, forest owners and those entrusted with forest management are allowed to establish a “Forest Management Plan” for a period of five years, which provides specific forest management practices and protection measures for the forests under their management as a whole entity, and thereby to apply for the approval by the mayor of the municipality. For the approved forest management, various incentive measures are taken in the aspect of finance and taxation to enable forest management in a sustainable manner.

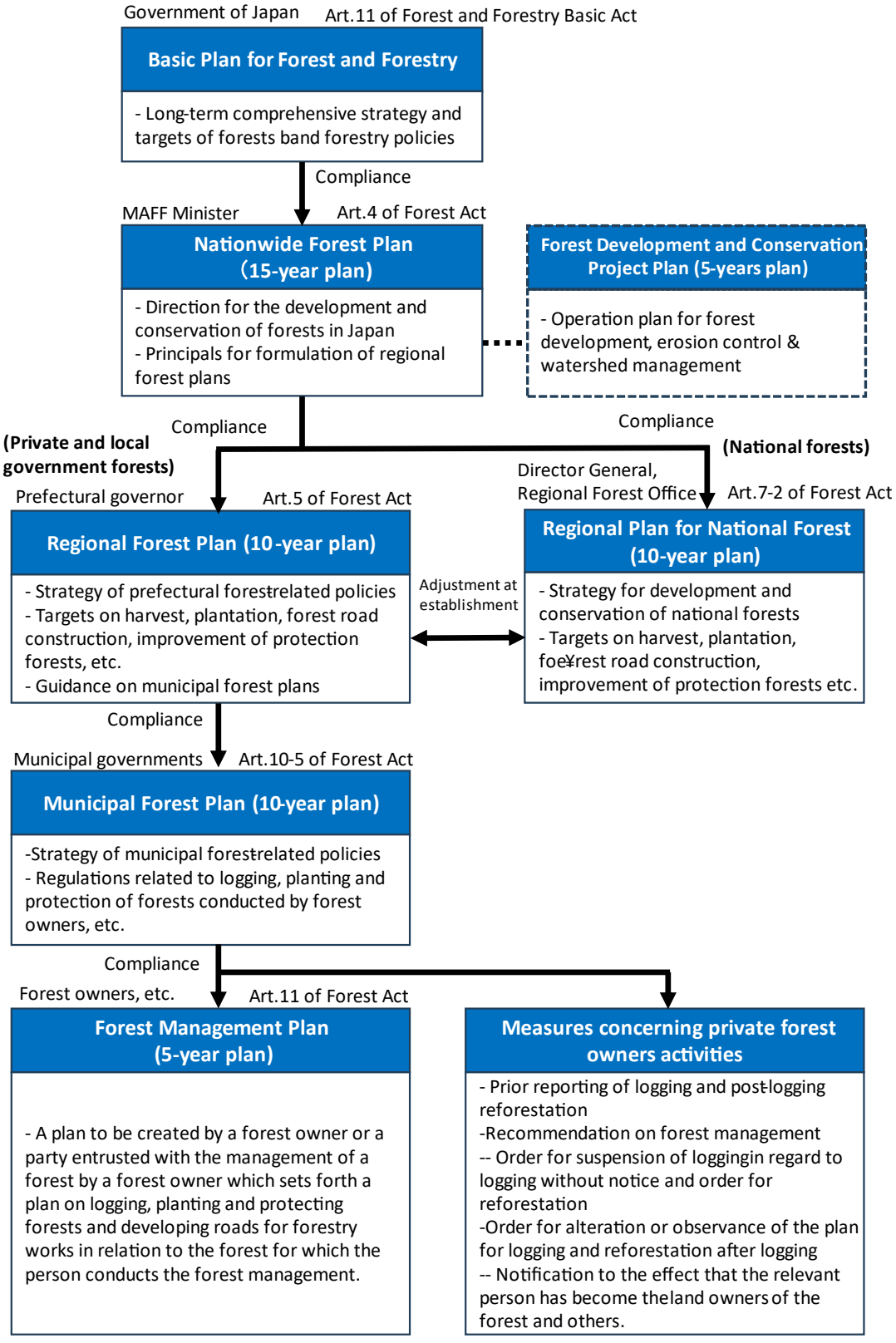


Figure 97: Structure of forest planning system
Source: Forestry Agency.

With regard to the promotion of wood use, the "Act for Promotion of Use of Wood in Public Buildings" was amended and renamed in 2021, and the "Act for Promotion of Use of Wood in Buildings to Contribute to the Realization of a Decarbonized Society" came into effect. In this law, the title of the law was changed, and

the purpose of the law was clearly stated to “contribute to the realization of a decarbonized society” and the basic principle on the promotion of wood use was newly established. In the Act, the scope of basic national policies was expanded from public buildings to buildings in general and new measures were taken, such as the establishment of a headquarters for wood use promotion, the establishment of the Agreement on the Promotion of Wood Use in Buildings, and the establishment of the Wood Use Promotion Day (October 8) and the Wood Use Promotion Month (October).

There are other laws which contribute to realizing sustainable forest management. In 2017, the “Act on Promoting the Distribution and Use of Legally Harvested Wood and Wood Products” (commonly known as the Clean Wood Act) was enacted to combat illegal logging. This law requires a wide range of businesses (wood-related business entities) that handle wood and wood products, including paper, furniture, construction, and woody biomass energy, to make efforts to use legally harvested wood. In 2025, the revised Clean Wood Act will come into effect, requiring business entities that are the first to acquire wood and wood products in the domestic market to confirm their legality. The purpose of the Act is to promote the use of wood that has been confirmed as legal through these efforts.

7.1.b Cross-sectoral policy and programme coordination

Rationale
This indicator provides information on the extent to which policies and programmes are coordinated across sectors to support the sustainable management of forests. Non-forest sector land use and development decisions may have a significant impact on forests and their use. Cross sector coordination of forest and non-forest related policies and programmes can promote improved forest management by helping to minimise adverse impacts and by strengthening the ability of countries to respond to national and global issues.

Current status and trends
Because forests are closely related to various aspects of economy, society, and environment, coordination is made at various levels of policy formation and implementation.

For example, the Forest and Forestry Basic Act provides that the Basic Plan for Forest and Forestry, which is Japan's basic policy on forest and forestry, is not formulated by the Minister of Agriculture, Forestry and Fisheries, who holds direct jurisdiction over forests and forestry, but by the government. When developing or changing the plan, detailed discussions and coordination are made among relevant ministries and agencies.

Conversely, policies under the jurisdiction of other ministries and agencies are also coordinated with policies related to forests and forestry in various ways. Efforts made in recent years include the following:

1. In light of the increasing severity and frequency of flood damage due to the effects of climate change, Ministry of Land, Infrastructure, Transport and Tourism and other relevant ministries and agencies are working together to promote "watershed flood control" to reduce flood damage in the entire watershed. In March 2021, watershed flood control projects were formulated and announced for all Class A river systems, and forest management and mountain disaster prevention measures were also included in all of them. Forestry Agency has implemented measures to maintain and improve the water retention capacity of forests and thinning to control rainwater runoff downstream as part of its efforts to contribute to watershed flood control. In addition, in order to reduce the obstruction of water flow downstream by driftwood, etc., measures to control sediment and driftwood runoff are implemented in cooperation with erosion control projects.

2. In November 2014, Forestry Agency and the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) jointly announced the "Roadmap for the Popularization of CLT" to promote the dissemination of CLT. Subsequently, through experiments by Forestry Agency and Ministry of Land, Infrastructure, Transport and Tourism, a public notice on the strength of CLT materials and general design methods for buildings using CLT was issued and enforced. Since 2016, the "Liaison Conference of Relevant Ministries and Agencies on the Promotion of CLT Utilization" has been held, and in January 2017, the Liaison Conference announced a "New Roadmap for the Popularization of CLT - Aiming at Further Expansion of Demand." In March 2021, a "New Roadmap for the Popularization of CLT - Toward Further Expansion of Utilization" was formulated and implemented in cooperation with MLIT and Tourism to raise awareness of CLT, eliminate cost disadvantages, supply to meet demand, expand the scope of utilization of CLT, train workers, and clarify maintenance and management. Furthermore, in September 2022, the Roadmap was revised and implemented in addition to the previous initiatives, such as the creation and dissemination of standard wooden models, standardization of dimensions of CLT panels, and rationalization of fireproofing standards.

3. Based on the "Act for Promotion of Use of Wood in Buildings to Contribute to the Realization of a Decarbonized Society" that went into effect in 2021, a new basic policy was established with goals such as the conversion to wood of all public buildings to be developed by the national government, except those that are difficult to convert to wood due to cost and technology, and all public buildings where the use of wood should be promoted, in principle. In FY2015, Forestry Agency and MLIT set up an investigation team to examine the reasons for some of such buildings were not built as wooden structures. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) revised the Structural Design Standard for Wooden School Buildings in March 2015 so that even engineers without experience of designing a large-scale wooden structure can plan and design wooden school buildings

relatively easily. MEXT also developed “Build Schools with Wood – Guide for construction of three-story wooden school buildings” in March 2016 (partially revised in October 2020).

4. With regard to climate change mitigation and adaptation, Ministry of Environment takes the lead in conducting a wide range of coordination with relevant ministries and agencies. In October 2021, the Cabinet approved the Plan for Global Warming Countermeasures, which is our country's plan to comprehensively and systematically promote measures against global warming. With regard to the medium-term goal of reducing greenhouse gas emissions by 46% from the FY2013 level by FY2030, the Plan clarifies measures to be taken by each entity and national measures and sets out a path to achieving the reduction target. It also sets out the long-term goal of achieving carbon neutrality by 2050. This plan is the cornerstone of Japan's efforts to combat global warming. In the same year, Government of Japan submitted to the United Nations the Japan’s NDC (nationally determined contribution), which describes new reduction targets, and the new Long-Term Strategy under the Paris Agreement, which aims to achieve carbon neutrality by 2050. In addition, the Climate Change Adaptation Act was enacted in June 2018 to clarify the legal status of climate change adaptation and to promote climate change adaptation more strongly through cooperation among various stakeholders, including the national government, local governments, businesses, and citizens. The Climate Change Adaptation Act came into effect in December of the same year. Under this law, the national government and local governments, in promoting measures related to climate change adaptation, shall endeavor to coordinate with measures related to the promotion of agriculture, forestry, and fisheries, and other related measures. In November of the same year, the “Climate Change Adaptation Plan” based on the Adaptation Act was formulated. Subsequently, the Adaptation Plan was revised in October 2021 based on the “Climate Change Impact Assessment Report” published in December 2020 and other information.

5. In 2020, MAFF and the Ministry of Economy, Trade and Industry (METI) established the Study Group for the Transformation of Forestry and Woody Biomass Power Generation into a Growth Industry to study measures to resolve issues related to woody biomass. In October 2020, a report summarizing the results of the study “Ensuring the Sustainability of Forests as Suppliers of Woody Biomass and Making Woody Biomass Power Generation Independent as a Power Generation Business” was released.

6. In May 2016, the SDGs Promotion Headquarters, headed by the Prime Minister and consisting of all Cabinet members, was established in the Cabinet to promote the implementation of the SDGs comprehensively and effectively through close coordination among relevant administrative agencies. Under the SDGs Promotion Headquarters, the SDGs Promotion Roundtable was established, consisting of a wide range of participants including NGOs/NPOs, experts, the private sector, and international organizations. At the 10 meeting of the SDGs Promotion Headquarters in June 2021, the “Voluntary National Review 2021 Report on the implementation of 2030 Agenda,” which is the second Voluntary National Review (VNR) since 2017 was adopted. In December 2023, the revised “SDGs Implementation Guiding Principles,” which is a medium- to long-term national strategy for Japan to implement the 2030 Agenda for Sustainable Development and the SDGs and achieve the SDGs in Japan and abroad by 2030, were adopted.

7. In order to further promote the use of wood in buildings, a new system of “Agreements for the Promotion of Wood Use in Buildings” was established following the enforcement of the Act on the Promotion of Wooden Urban Buildings. Under these agreements, two parties, including the national government or local governments and building owners, or three parties, including timber industry operators and building operators, conclude agreements. As of the end of March 2024, 17 agreements had been concluded in the national government and 113 in local governments.

7.2.a Taxation and other economic strategies that affect the sustainable management of forests

Rationale
This indicator provides information on the economic strategies that affect the sustainable management of forests. Government policies and strategies on investment, taxation and trade may influence both forest management and the level of long term investment in forestry.

Current status and trends
To promote sustainable forest management, finance and credit guarantee measures are provided in Japan. Since it usually takes several decades for forest investment to make profits, reductions and exemptions have been made for income and inheritance taxes, etc., considering the long-term nature of the forest investment.

In addition, with a view to securing stable financial resources necessary for forest development and other activities undertaken by municipalities, the Act on the Forest Environment Tax and the Forest Environment Transfer Tax was enacted, and the Forest Environment Transfer Tax was first granted in FY2019. In FY2024, the taxation of the Forest Environment Tax, which is the source of the Forest Environment Transfer Tax, began. Municipalities across the country are making use of the Forest Environment Transfer Tax to implement various initiatives in accordance with their local circumstances, such as forest development, human resource development and the Securing and nurturing the next generation of workers, timber utilization, and raising public awareness.

The forestry insurance system has been established as comprehensive insurance to compensate for damage to forests due to fire, meteorological disasters, and volcanic eruptions. Forestry insurance is a system that designed to ensure stable forestry management and the only safety net for forest owners themselves to prepare for disasters.

7.3.a Clarity and security of land and resource tenure and property rights

Rationale
This indicator provides information on land, forest and resource tenure, laws and rights. Clear title identifies rights and responsibilities under the law with respect to land and resources, while due process ensures that these rights can be protected or disputed. Lack of clear ownership or due process may hinder the active engagement of stakeholders in the sustainable management of forests, or leave forests vulnerable to illegal or unsustainable use.

Current status and trends
In Japan, an individual's property right is guaranteed by the constitution, and the Civil Code is enacted to provide basic matters concerning ownership of land, including forests.

On the other hand, there are forests with unknown boundaries and forests of unknown ownership by not making transfer registration at the time of inheritance, as a result of reduced owners' interest in forests due to the fall in wood prices, aging of forest owners, and other factors. Identification of the owners and clarification of boundaries have become a challenge for appropriate forest management.

For the identification of forest ownership, the revision of the Forest Act in 2011 led to the start of a system to require new forest owners to notify the mayor of the relevant municipality of the ownership in April 2012. In addition, an administrative body can use information on forest owners and request other administrative bodies to provide information necessary to identify forest owners, etc. Furthermore, the 2016 revision of the Forest Act led to the establishment of a system whereby the municipalities create a forestland registry including forest land ownership and the implementation status of boundary surveys and publish a part of the content.

In addition, in 2019, the enforcement of the Private Forest Management Entrustment Act introduced the Private Forest Management Entrustment System. Under the 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 authorized private forestry operators. Otherwise, the municipalities will manage those entrusted forest by themselves. Under this system, special provisions are made to allow municipalities to be entrusted with management in cases where the whereabouts of some or all of the owners are unknown, following certain procedures such as search and public notice.

7.3.b Enforcement of laws related to forests

Rationale
This indicator provides information on the extent to which forest- related laws and regulations are enforced. The ability to successfully prosecute offenders is essential in combating harmful activities that may threaten forests and their sustainable management (e.g. illegal forest conversion and illegal logging).

Current status and trends
Laws, regulations, and policies that support the sustainable forest management mentioned in Indicator 7.1.a are enforced by the national, prefectural, and municipal governments based on their roles.

As of 2023, about 4,000 officials are working at Forestry Agency under MAFF. They develop basic policies and plans based on various laws and regulations, grant subsidies for private forest administration, provide technical guidance and advice. In total seven Regional Forest Offices and 98 District Forest Offices under Forestry Agency directly manage national forests for the conservation and management of national forests, conduct patrols and educational activities in cooperation with local public bodies, police, volunteer groups, and others to prevent forest fires, illegal collection of plants, and damage by pests/animals. For example, the heads of District Forest Offices and foresters are given strong authorities, such as special judicial police officers, to crack down on thefts in national forests.

Prefectures and municipalities enforce forest-related laws and regulations for private forest (i.e., publicly-owned forests and privately-owned forests) and manage publicly-owned forests owned by them.

As of 2023, there were about 9,000 forest officials in 47 prefectures nationwide. They are engaged in establishing Regional Forest Plans and providing forest land development permits from a wide-area perspective such as watersheds. They also provide subsidies for forest improvement projects carried out by municipalities of forest conservation projects.

As of 2023, there were about 9,000 officers responsible for forestry in 47 prefectures across Japan. They are engaged in establishing Regional Forest Plans and providing forest land development permits from a wide-area perspective such as watersheds. They also provide subsidies for forest improvement projects carried out by municipalities and implement mountain disaster control projects.

There are 1,741 municipalities nationwide (As of October 2024. Include special wards), some of which have no forests, but as of 2023, there were about 3000 forest officials in total and they are responsible for forestry at the municipal level. As administrative entities closely attached to the communities, they develop local forest improvement plans and supervise forest management practices by forest owners.

As for the forest development among activities that could threaten forests and their sustainable management, logging operations and changes to the form and nature of land, etc. are regulated in protection forests. For private forests other than protection forests, forest land development permission system has been established to ensure appropriate use of forest land. Under the system, forest conversion exceeding a certain scale requires a permit from the prefectural governor. Penalties for violations of the system, including violations of permit conditions and unauthorized acts, are imprisonment (up to three years) and fines (up to 3,000,000 yen).

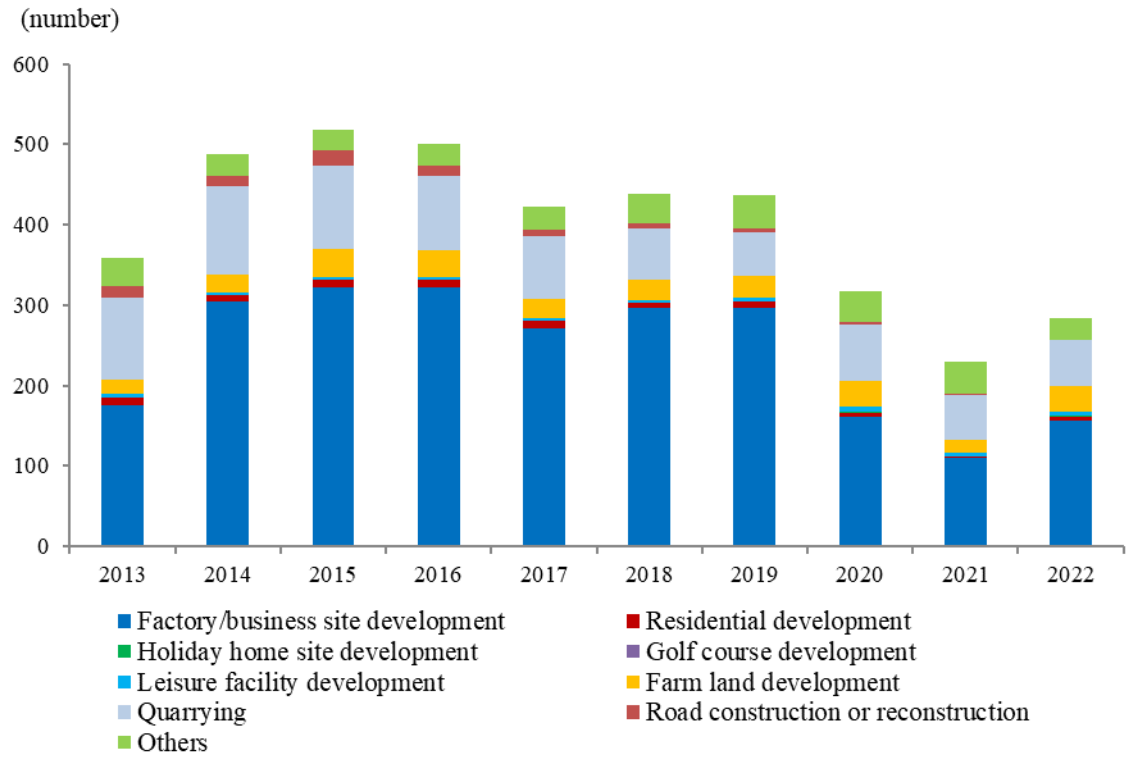


Figure 98: Trends in the number of forest land development permission
Source: Forestry Agency.

In addition, dangerous embankments associated with forest land development are comprehensively regulated based on uniform standards across the country, regardless of the use or purpose of the land, in accordance with the Act on Regulation of Residential Land Development and Specific Embankments (It is commonly known as the Embankments Regulation Act.). If embankments exceeding the regulated size are carried out within the regulated area, permission or notification from the prefectural governors is required to take necessary measures to prevent disasters, and effective imprisonment and fines are imposed for acts without permission or violations of safety standards.

In cases where logging operation is restricted, logging operation requires prior permission by the prefectural governor in protection forests that are designated as particularly necessary to secure the public interest functions of forests. Even in private forests other than protection forests, it is mandatory to submit a plan of logging operation and subsequent afforestation to the mayor in advance. There are also penalties for failure to do so appropriately. It is also mandatory to report the forest conditions related to the logging and afforestation after completing the afforestation. In addition, the Forest Act provides punishment for theft, arson, and violations of a permit for lighting fires and various other restricted activities in protection forests.

Furthermore, with regard to measures against illegal logging, the Act on Promotion of Use and Distribution of Legally- harvested Wood and Wood Products (the Clean Wood Act), which went into effect in May 2017, requires a wide range of businesses (wood-related business entities) that handle wood products, including paper, furniture, construction, woody biomass energy, etc., to strive to use legally harvested wood and wood products. Under the Act, wood-related business operators that appropriately and reliably implement measures to ensure the use of legally harvested wood and wood products may apply to and be registered by a "Registering Organization," a third-party organization designated by the competent ministers, and use the name "Registered Wood-related Business Entities." Currently, five Registering Organization are in operation, and as of the end of March 2024, there were 660 Registered Wood-related Business Entities.

7.4.a Programmes, services and other resources supporting the sustainable management of forests

Rationale
This indicator provides information on the capacity of both government and private organisations to deliver programmes and services, to maintain and develop infrastructure and to access the financial and human resources necessary to support the sustainable management of forests.

Current status and trends
The forestry road systems are developed for a stable supply of wood and efficient implementation of management practices which are necessary for sustainable fulfillment of multiple functional roles of forests. It is the most important production infrastructure of forestry. Because the development of the forestry road systems can improve access to workplaces, improve safety through the introduction of machinery, and reduce the time required for emergency transport at the time of an industrial accident, it contributes to the improvement of forestry working conditions. In addition, when public roads have been blocked due to an earthquake or other natural disaster, the forestry road systems have been used as a bypass.

In a survey on forestry road systems development, about 60% of forest management entity answered that the density of forestry road systems is less than 50 m/ha. In Japan, the forestry road systems remain underdeveloped mainly due to the steep topography, diverse geological structures, and other factors. As of the end of FY2023, the density of the forestry road systems was 25.2 m/ha.

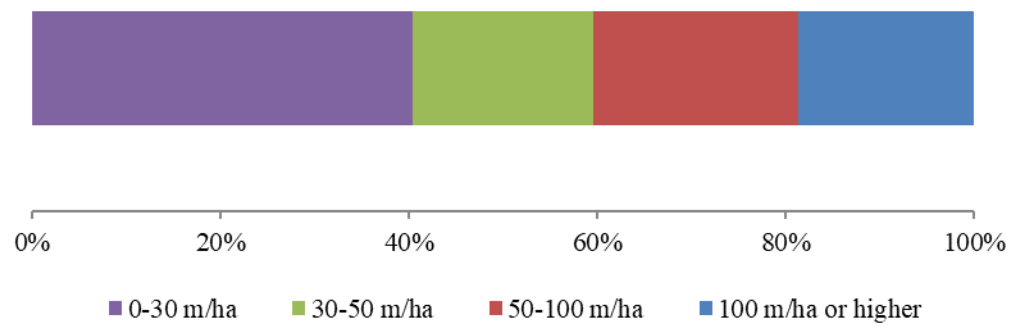


Figure 99: Status of development of forestry road systems
Note 1: Responses from those who answered that they intend to continue forestry management in the future.
Note 2: Non-responses are excluded.
Source: MAFF, Survey on Awareness/Intention on Cyclic Use of Forest Resources (2020).

High performance forestry machines significantly improve work efficiency and reduce the burden on the human body compared with conventional machines such as chainsaws and bush cutters. In Japan, the introduction of high-performance forestry machines started in the latter half of the 1980s. The number of such machines, especially forwarders, processors, harvesters, and other vehicle-type machines, which essentially require forestry road systems, has been increasing in recent years. As of FY2022, a total of 12,601 units were owned, up 12% from the previous year.

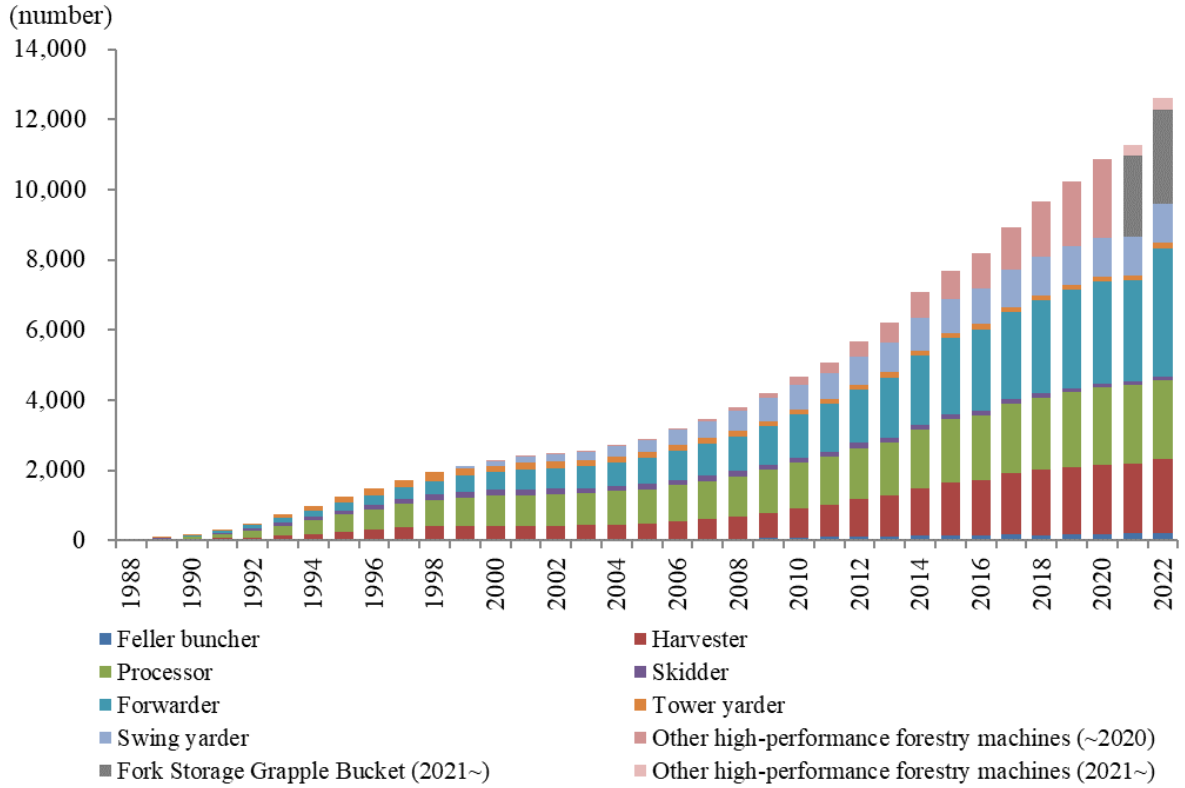


Figure 100: Changes in the number of high-performance forestry machines

Note 1: The figures are the total number of machines owned by forestry management entities for their own use during the fiscal year, regardless of the type of ownership (owned, borrowed, leased, rented, etc.) or the length of ownership.
Note 2: The figures for Tower yarders include the number of Swing yarders up to FY1998.
Note 3: The survey on the figures for Other high-performance forestry machinery started in FY2000.
Note 4: The figures for other high-performance forestry machinery include the figures for Fork Storage Grapple Bucket up to FY2020.
Note 5: The figures for Fork Storage Grapple Bucket include those with a felling head.
Note 6: The figures for Forwarders refer to only those equipped with grapple loaders up to FY2021, but include those not equipped with grapple loaders from FY2022 onwards.
Source: Forestry Agency.

There are a wide range of human resources engaging in the promotion of sustainable forest management, which include technical experts, e.g., people who convey information on forests to the public and people who protect and grow trees.

Table 14: Forest-/forestry-related technical experts

Forestry extension advisor	Persons who have passed the national qualifications based on the Forest Act and is appointed by a prefectural governor to disseminate techniques and knowledge on forests and forestry as well as providing guidance on forest management practice to forest owners. They also conduct research and studies on specialized subjects in cooperation with research and development institutes.
Forester	Persons who have passed the national qualifications based on the Forest Act, providing support to local municipalities to plan their regional policy plan on forests and forestry.
Professional engineer (forest sector)	Persons who have national qualifications based on the Professional Engineer Act and are registered to the government, and have technical expertise on science and technology, high practical skills, and rich operational experience (there are 21 technology divisions, including forest, construction, machinery, electric/electronic, and agriculture).
Forestry expert	Persons who have private-sector qualification recognized by the Japan Forest Technology Association and practice expertise concerning technical operations, including forest civil work.
Forest instructor	Persons who have the qualification recognized by the Japan Forest Recreation Association and provide general public with knowledge on forests and forestry, lead the way in forests and provide instructions on outdoor activities in forests.
Tree doctor	Persons who have the qualification recognized by the Japan Greenery Research and Development Center and engage in protection, vigor recovery, treatment of giant trees, old trees, etc. beloved as symbols of a hometown.
Certified Forest Practice Planner	Persons with a qualification certified by the Japan Association of Forest Management Planners who makes proposals to forest owners, such as thinning, as an employee of a forest owners' cooperative or private business entity.
Certified Forest Management Planner	Persons with a qualification certified by the Japan Association of Forest Management Planners who plans and practices sustainable use of forests, such as reforestation after logging, and the development of profitable timber sales.

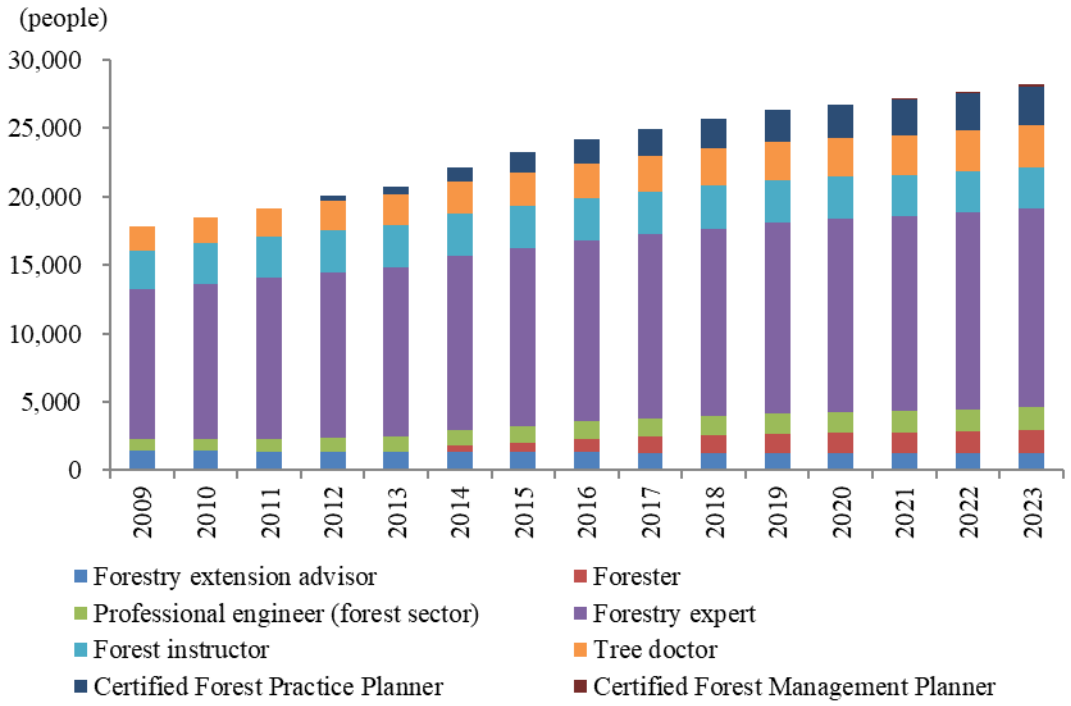


Figure 101: Changes in the number of forest-/forestry-related technical experts

Source: Prepared by Forestry Agency. The figures for Professional engineer are surveyed by the Institution of Professional Engineers, Japan; Forestry expert was surveyed by the Japan Forest Technology Association; Certified Forest Practice Planner and Certified Forest Management Planner were surveyed by the Forest Planners Association.

Japan is affected by many natural disasters, including heavy rain accompanying weather fronts and typhoons, and earthquakes under the condition of the steep topography and fragile geological conditions. To address this challenge, the government is promoting forest conservation projects as one of the important pillars of land conservation measures. These projects maintain and improve forest functions through the maintenance and development of forests, contribute to the protection of people's lives and properties from mountain disasters, and promote the conservation of water resources and the preservation and formation of living environments. Currently, based on the Basic Plan for Forest and Forestry, it is focused on the implementation of;

(1) Control sediment runoff through detailed placement of erosion control dams in mountain disaster risk areas, etc.
(2) Strengthening forest soil conservation through a combination of forest improvement and slope reinforcement
(3) Reduce the risk of driftwood disasters by cutting down hazardous trees and changing forest types in stream areas
(4) Prevention of tsunami and wind damage by strengthening coastal disaster prevention forests, etc.

In implementing these measures, the efficiency of measures by extending the service life of existing facilities and promoting the introduction of new technologies such as information and communication technology (ICT) are to be improved.

7.4.b Development and application of research and technologies for the sustainable management of forests

Rationale
This indicator provides information on the capacity to develop and incorporate new science, research, and technologies into forest management. Continuous improvement in the depth and extent of knowledge and its application will help ensure advances in the sustainable management of forests.

Current status and trends
The FFPRI under the Forest Research and Management Organization is Japan's core comprehensive research and development institute conducting research and development on forests, forestry, wood industry, and forest tree breeding. In collaboration with the national government and a wide range of related organizations, the FFPRI is taking the lead in research and development and forest tree breeding to solve problems faced by the forest, forestry, and lumber industries and to meet regional needs. Its medium- to long-term plan covering the period from FY2021 to FY2025 identifies the following priority research tasks. Various experiments and research are being implemented in line with the policy.

1. Research and Development for Exerting the Multiple Functions of Forests under Environmental Change
   (a) Research and Development for Mitigating and Adapting to the Effects of Climate Change
   (b) Research and Development for Sustainability based on Understanding the Diversity and Functions of Forest Organisms
   (c) Research and Development for Forest Conservation and Disaster Prevention and Reduction

2. Research and Development for Achieving a Sound Material-Cycle Society and Developing Mountain Villages by Utilizing Forest Resources
   (a) Research and Development for Promoting the Stable Supply of Forest Products and the Diverse Use of Forest Space
   (b) Development of Control Technology and Microbial Utilization Technology Using Biological Characteristics
   (c) Research and Development for Advancing Wood Utilization Technology and Expanding Demand
   (d) Research and Development for Expanding Social Implementation of New Wood Materials and Wood Biomass Energy

3. Forest Tree Breeding Contributes to the Creation and Conservation of Diverse Forests and Sustainable Resource Utilization
   (a) Development of Diverse and Excellent Varieties through Enhancement of Forest Tree Breeding Infrastructure
   (b) Advancement and Expansion of Forest Tree Breeding Technology and Promotion of Specific Mother Trees

Research and technology development for sustainable management of forests are also conducted broadly at research institutes of local public bodies and private companies as well as at universities.

7.5.a Partnerships to support the sustainable management of forests

Rationale:
This indicator provides information on partnerships and their contribution to the sustainable management of forests. Partnerships may help create a shared purpose and are important tools in building capacity; leveraging financial, technical and human resources; strengthening political commitment; and in developing public support to advance the sustainable management of forests.

Current status and trends
Partnership to promote the improvement and conservation of forest, and the sustainable use of forest resources is formed by various bodies at various levels.

An example of a public-private partnership agreement pertaining to the national forest program is "public function maintenance and promotion agreement system," which was established through the revision of the Forest Act in 2012. In this system, owners of private forest land adjacent or between national forests and the director of the relevant Regional Forest Office sign an agreement for integrated improvement and conservation under a national forest project. By the end of FY2023, 20 agreements were made, and thinning to maintain public functions, elimination of exotic tree species for preservation of World Natural Heritage Sites, etc. has been implemented under the agreement.

In addition, there is a program to improve national forests with citizen participation. Under this program, the responsible organization and the head of the District Forest Office enter into agreements for plan-based implementation of forest development activities. The program provides various schemes, including: "Forests for Voluntary Groups" (forest for interaction with nature) conducted by volunteer groups; "Forests for social contribution," where companies improve the forest as their social responsibilities; "Forests for Wood Culture" (indicator 6.5.a) for activities to supply wood, bark, and other materials necessary for passing down the culture of wood, including historic wood buildings and traditional woody crafts, to the next generations; and "Forests for Students" for providing opportunities for schools to engage in experiential and educational activities in forest environments.

As examples of intergovernmental partnerships, "Joint Statement of Cooperation on Sustainable Forest Management, Combating Desertification and Wildlife Conservation," was issued at the Fifth Japan-China-Republic of Korea (ROK) Trilateral Summit Meeting (Beijing, May 2012). The statement reaffirmed the need to establish dialogue among the three countries on sustainable forest management and enhance in-depth and all-round cooperation on sustainable forest management policy, administration, and technology. Based on the statement, in principle, the three countries take turns to host the annual Trilateral Director General Level Meeting on Forestry Cooperation among Japan, China and ROK.

In 2015, Japan and India signed a "Memorandum of Cooperation in the Field of Forests and Forestry." A joint working group meeting is held every year to exchange opinions on the cooperation between the two countries.

Furthermore, in 2024, Japan and Austria signed a "Memorandum of Cooperation on Sustainable Forest Management and Wood Use," and Japan and Vietnam signed a "Memorandum of Cooperation in the Field of Forests and Forestry."

7.5.b Public participation and conflict resolution in forest-related decision making

Rationale
This indicator provides information on the processes that promote public participation in forest-related decision making and reduce or resolve conflict amongst forest stakeholders. Public participation in decision making processes and conflict resolution efforts can lead to decisions that are widely accepted and result in better forest management.

Current Status and Trends
Generally, there are broad-ranging opportunities for citizen participation in the policy-making process in Japan. For forest-related policies, the Forestry Policy Council has been set up based on the Forest and Forestry Basic Act. It consists of members from a wide range of fields, including scholars, people involved in forests/forestry, and environmental organizations. Various laws and regulations provide that the government should consult with the council when formulating a plan, etc. At the local level, prefectural forestry administration councils are set up based on the provision of the Forest Act. A prefectural governor must consult with the council when making a decision on forest-related policy, including the establishment of a Regional Forest Plan.

In addition, the Administrative Procedure Act has established a public comment procedure. Opinions and information on proposed plans are invited from the general public.

To address disputes, there is a legal framework to provide a means for settlement, including the Code of Civil Procedure according to the content of the dispute.

7.5.c Monitoring, assessment and reporting on progress towards sustainable management of forests

Rationale

This indicator provides information on the capacity to monitor, assess and report on forests. An open and transparent monitoring and reporting system that provides up-to-date and reliable forest-related information is essential for informed decision making, in generating public and political awareness of issues affecting forests, and in the development of policies to underpin the sustainable management of forests.

Current status and trends

Regarding forest resource information, a forest plan is established for each of the 158 river basins in Japan. Every five years, prefectural governors establish Regional Forest Plans for private forests, while director generals of Regional Forest Offices create a Regional Plan for national forest for respective region. To provide basic data for this purpose, inventory data and forest planning maps are prepared. They form a database of tree types, ages, growing stocks, and land regulation status, etc. of each forest sub-compartment. All prefectures introduced forest GIS (Geographic Information Systems) by the end of FY2009 and developed a system for digitalization and unified management of basic forest data, including forest inventory and forest planning maps. It is important to continuously update the information and improve the accuracy. In order to intensify management practices, it is necessary to build a system where parties who belong to different organizations can share forest information. To this purpose, a forestry-cloud has been developed. This is a system to connect local public bodies and forestry establishments using communication lines based on cloud technology to enable the sharing and utilization of forest information. Furthermore, in addition to the data that is already fed to the forest GIS, detailed data of forest resources based on airborne laser measurement, aerial photographs, satellite imagery, forest road plans, and other information are fed to facilitate intensification of management practices.

Carbon flow is calculated based on these forest resource data and incorporated in the National Communication (NC) and the Biennial Transparency Report (BTR) that Japan submits to the secretariat of the UNFCCC.

In addition, the NFI survey has been conducted since 1999 with the aim of obtaining objective data necessary for establishing basic matters for forest management in forest plans by assessing forest conditions and trends of their changes based on nationally unified methods. This is a sample survey that sets a lattice at 4 km intervals across the country and surveys its intersections. Detailed data have been gathered on diameter at breast height (DBH) of standing trees, tree type composition, withering of standing trees, understory vegetation, soil, and other conditions. The survey of entire country is conducted in a 5-year cycle, and in the 4th NFI survey (201-2018), approximately 13,000 plots were surveyed nationwide, and the results are compiled. The 5th NFI survey (2019-2023) has now been completed and the results are being compiled. The 6th NFI survey has been conducted since 2024.

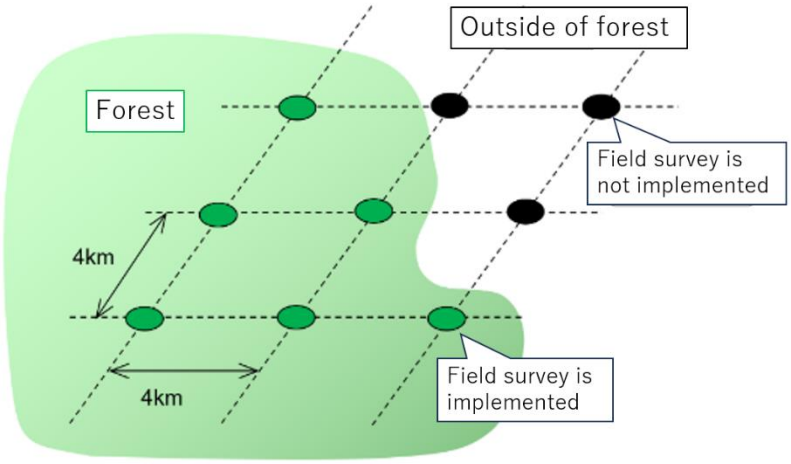


Figure 102: Structure of monitoring plots of National Forest Inventory survey
Source: Forestry Agency.

In addition, various statistics are published, including damage to forests and socioeconomic trends related to the forestry and wood industry. “State of Forest Resources, Statistics on Forests and Forestry” is published every year with comprehensive data related to forests, forestry, and wood industry.

The Forest and Forestry Basic Act provides that the government must submit to the Diet a report on the trends in forests and forestry, and the measures for them taken by the government every year. Based on the report, the Annual Report on Forest and Forestry is created and published every year. Annual Report on Forest and Forestry since FY1964 are posted online. An English version of abridged editions also began to be published, starting from the FY2007 edition.

Based on the Government Policy Evaluations Act enacted in 2001, each administrative organ implements policy evaluation with the aim of measuring, analyzing, and evaluating the effects of their policy and to reflect the results of this evaluation in the planning and development of policy, and to promote efficient, high-quality, and output–oriented administration, and ensuring the government's proper discharge of its responsibility to remain accountable to the public for its operations. Performance indicators are set for evaluation of policies related to forest and forestry: 18 indicators in the policy area of fulfillment of multiple forest functions, 7 in the policy area of sustainable and sound development of forestry, and 5 in the policy area of supply and use of forest products. Information on their progress is reported every year.

Tables and Figures

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Criterion 4

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List of abbreviations

CLT	cross laminated timber
FAO	Food and Agriculture Organization
FFPRI	Forestry and Forest Products Research Institute
FRA	Global Forest Resources Assessment
FTBC	Forest Tree Breeding Center
GHG	greenhouse gas
HWP	harvested wood product
ITTO	International Tropical Timber Organization
JAXA	Japan Aerospace Exploration Agency
JMA	Japan Meteorological Agency
MAFF	Ministry of Agriculture, Forestry and Fisheries
METI	Ministry of Economy, Trade and Industry
MEXT	Ministry of Education, Culture, Sports, Science and Technology
MHLW	Ministry of Health, Labor and Welfare
MIC	Ministry of Internal Affairs and Communications
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MOE	Ministry of the Environment
MOF	Ministry of Finance
NFI	National Forest Inventory* *The 1st survey (1999 to 2003) and 2nd survey (2004 to 2008) were named “Forest Resource Monitoring Survey”, and the 3rd survey (2009 to 2013) onward was called “Basic Survey on Forest Ecosystem Diversity.”
NIES	National Institute for Environmental Studies
NTFPs	non-timber forest products
NWFPs	non-wood forest products
SDGs	Sustainable Development Goals
UNFCCC	United Nations Framework Convention on Climate Change